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ABSTRACT

The purpose of this curriculum guide is to help teachers implement the Alabama Course of Study: Science. The major emphasis of the guide is to provide student-oriented, hands-on activities that engage students in "sciencing" behaviors. This guide has to major components, the table of contents and the activities. The table of contents list by Roman numeral the units covered in grade 1. Each unit is organized into topics that describe further the content of the grade level. The smallest organizers in the table of contents are the student outcomes that describe in detail what students are expected to learn about each topic. After each outcome, one or more page numbers direct the reader to a classroom activity (or activities) that addresses the specific outcome. The second and largest component of the guide consists of classroom activities. Each activity begins with identifiers that summarize and introduce the activities. The identifiers are the Unit, Topic, and Outcome(s) addressed by the activity. Each activity contains a background section that provides teachers with information they may need to teach the activity effectively. Following the background, all materials needed for the activity are listed in a section entitled "Materials." Procedures for implementing the activity are outlined next. In some cases, extensions of an activity or source for an activity appear after the section on procedures. Units include the following: (1) "Animals"; (2) "Plants"; (3) "Space"; (4) "Seasons and Weather"; (5) "Matter"; (6) "Energy and Machines"; (7) "Magnets"; and (8) "Contributions and Careers in Science." (KR)

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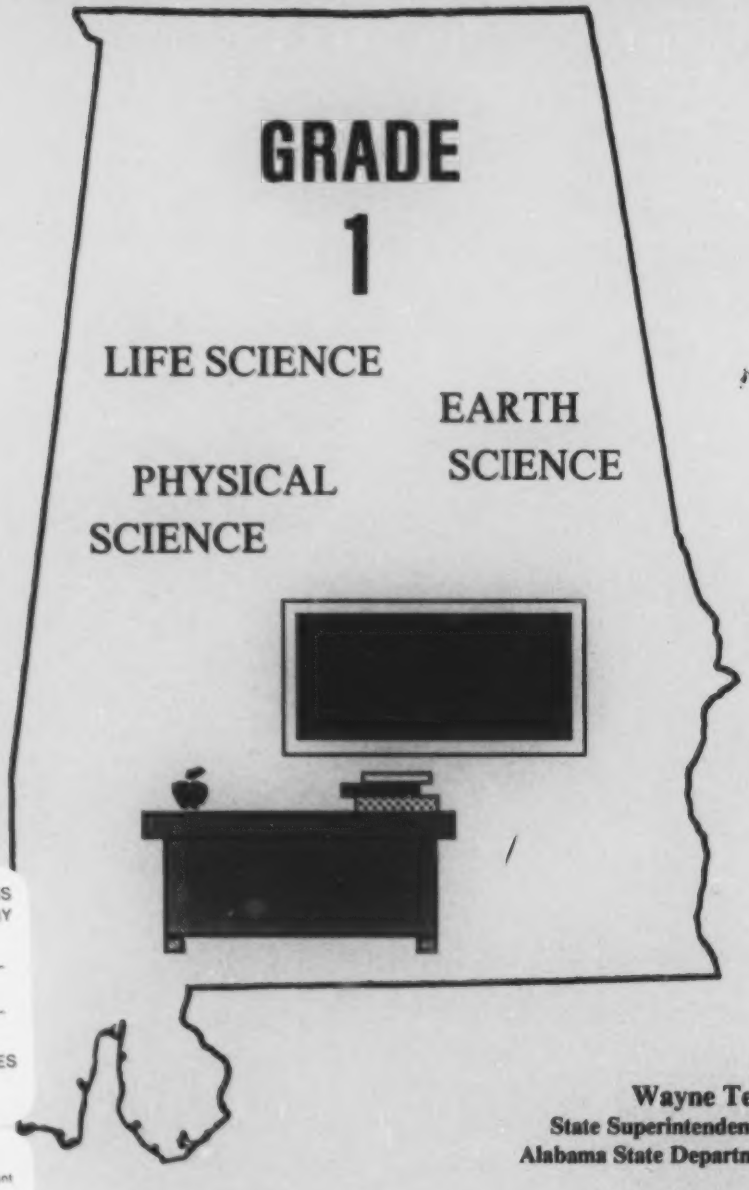

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Alabama State Department of Education

Bulletin 1989, No. 71

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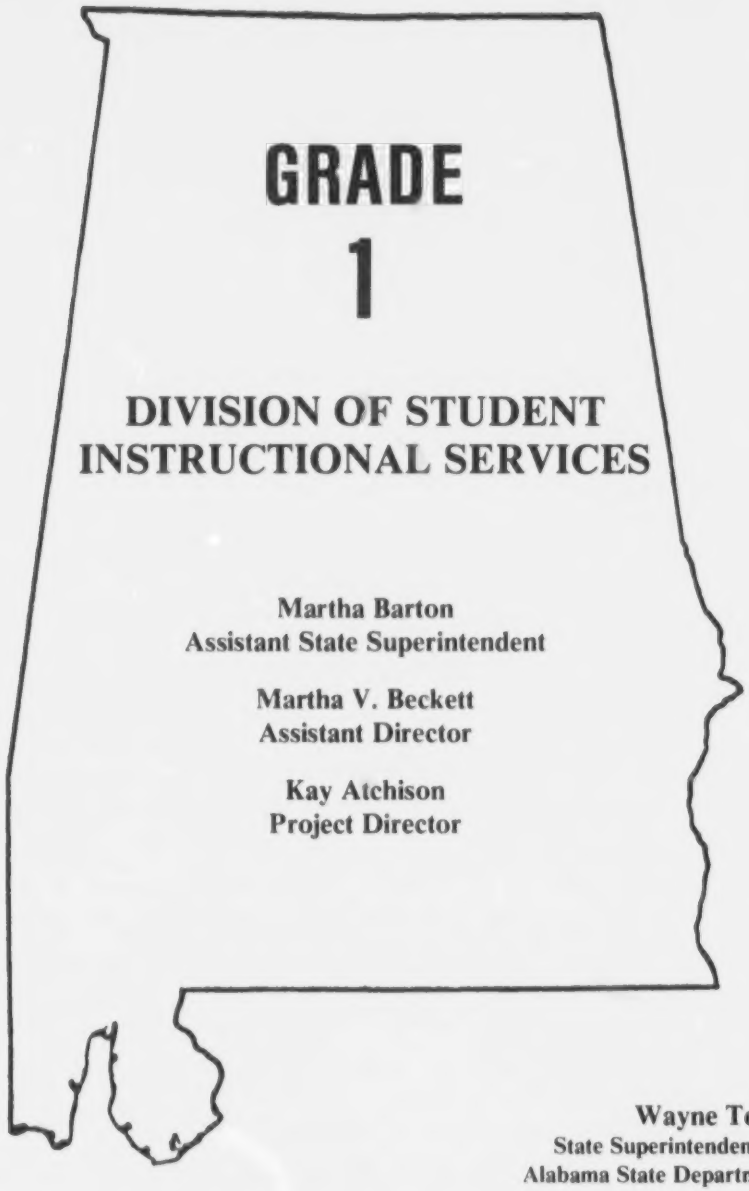

GRADE 1

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Bulletin 1989, No. 71

INTRODUCTION

The science curriculum guides consist of nine documents, one for each grade kindergarten through grade eight. The purpose of these curriculum guides is to help classroom teachers implement the Alabama Course of Study: Science (Bulletin 1988, No. 35). The major emphasis of each guide is to provide student-oriented, hands-on activities that engage students in "sciencing" behaviors.

The science curriculum guides have two major components, the Table of Contents and the activities. Each guide begins with the Table of Contents that lists by Roman numerals the units covered at a grade level. Each unit is organized into topics that describe further the content of the grade level. The smallest organizers in the Table of Contents are the student outcomes that describe in detail what students are expected to learn about each topic. After each outcome, a page number(s) directs the reader to a classroom activity (or activities) that addresses the specific outcome.

The second and largest component of the guide consists of classroom activities. Each activity begins with identifiers that summarize and introduce the activities. These identifiers are the Unit, Topic, and Outcome(s) addressed by the activity. Each activity contains a Background that provides teachers with information they may need to teach the activity effectively. Following the Background, all materials needed for the activity are listed in a section entitled Materials. Procedures for implementing the activity are outlined next. In some cases, extensions of an activity or sources for an activity appear after the Procedures.

The science curriculum guides are supplemental in nature. They were created to complement and enrich locally-developed science curriculum plans and to provide instructional resources for all topics named in the Alabama Course of Study: Science. Consequently, each activity in the curriculum guide stands alone and does not need to be taught in the order in which it appears in the document. It is expected that local education agencies will sequence the activities in this guide to correspond with the order in which topics are outlined in their locally-developed scope and sequence for science.

ACKNOWLEDGEMENTS

From its inception, the development of curriculum guides has been viewed as a cooperative effort between specialists in the Division of Student Instructional Services and selected teachers from public schools in Alabama. While the Curriculum Development Section, under the leadership of Katherine Mitchell, had the responsibility for coordinating the project, approximately 75 educators contributed directly to the science curriculum guides.

Work on the science curriculum guides started in the fall of 1988 when Kay Atchison was selected as Project Director for grades K-6 and Donna Bentley was named Project Director for grades 7 and 8. The second phase of the project involved the recruitment and training of approximately 35 classroom teachers and university instructors who wrote activities for the guides. For six months (December 1988 through May 1989) writers created activities to address specific outcomes, and the State Department of Education staff typed, edited, and proofread numerous drafts of the activities.

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GRADE 1
LIFE SCIENCE

UNIT: Animals
TOPIC: Kinds of Animals
OUTCOME: 1. Identify different kinds of animals.

Background

Prepare animal flash cards by collecting pictures of various animals (reptiles, amphibians, birds, insects, crustacea, spiders, and mammals) and gluing them onto index cards. The cards may be laminated or covered with clear, adhesive-backed paper for greater durability.

Materials

- Various animal pictures
- Index cards, 3" x 5"
- Glue
- Clear, adhesive-backed paper
- Safety pin

Procedures

1. Show the animal flash cards to the students. Identify the name of each animal, and discuss the characteristics of each.

2. Tell students they are to play a game called "Animal Guessing." Choose one student to be the "animal." Pin an animal flash card on the student's back. Ask the student to turn his or her back to the class and show the other students the animal card. Tell the "animal" student that he or she may ask the class ten questions that are to be answered with a "yes" or a "no." (Example: Does the animal have brown fur?) Instruct the class to respond to the question only with a "yes" or a "no." If the "animal" student has not guessed which animal he or she is after question ten, ask another student to give one hint. Give the "animal" student another chance to guess the correct animal. If the student is unable to guess the answer at this time, permit the class to tell the answer.

3. Repeat the game several times. Use various animal cards.

GRADE 1
LIFE SCIENCE

UNIT: Animals
TOPIC: Kinds of Animals
OUTCOME: 2. Classify animals into groups based on their characteristics.

Background

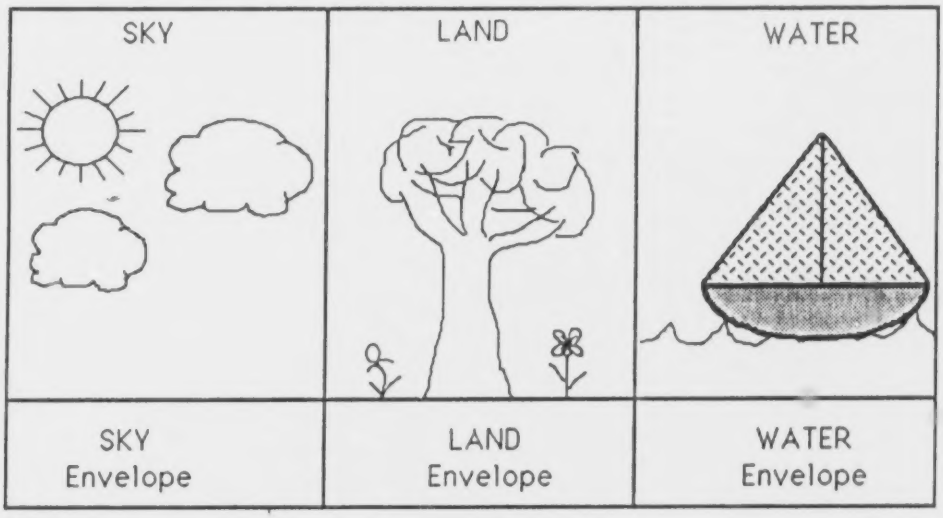
Appendages that are modified for walking, running, or brachiating (moving by swinging from branch to branch with the arms) are characteristic of land animals. Deer, monkeys, people, and insects are all obvious examples of land animals. Discuss exceptional animals, such as the ostrich, which is classified as a bird but uses its legs for locomotion and lives on land. Some birds may fit into two or three categories.

Water animals have appendages that are modified into flippers, fins, or flukes. These appendages are used for locomotion. Obvious examples of water animals are fish, sharks, dolphins, and whales. Some animals that live on land and in the water are sea turtles, seals, sea lions, and walruses. Some birds may also fit this category.

Animals that use appendages for flight are birds, bats, and some insects. Flying squirrels move by gliding and may be placed in either category.

Snakes have no appendages and move by using body scales and muscular contractions. Snakes may fit in the land or water category.

Divide a poster board into three columns. Decorate the first column to represent the sky; the second, water; and the third, land. Attach envelopes to the bottom of each column for placement of pictures during the activity.



OUTCOME 2 (Continued)
Background (Continued)

Collect pictures of animals that fly, swim, and move on land. Mount the pictures on index cards. Laminate the poster and cards or cover them with clear, adhesive-backed paper. Store index cards in a folder.

A simple bar graph is used in this activity as a means of recording data. This activity could be utilized in a learning center or as a class activity.

Materials

- Poster board
- Animal pictures
- Index cards
- Glue or tape
- Clear, adhesive-backed paper or laminating paper
- Handout: GRAPH
- Crayons

Procedures

1. Display the animal cards and the poster SKY, LAND, WATER. Encourage students to discuss the similarities and differences between animals and the characteristics that each possesses in order to live and survive in a particular habitat. Include the following questions:

   a. What characteristics do land animals (animals that specifically use their legs, arms, or both for locomotion) have in common?

   b. What characteristics do animals that fly have in common?

   c. What characteristics do animals that swim have in common?

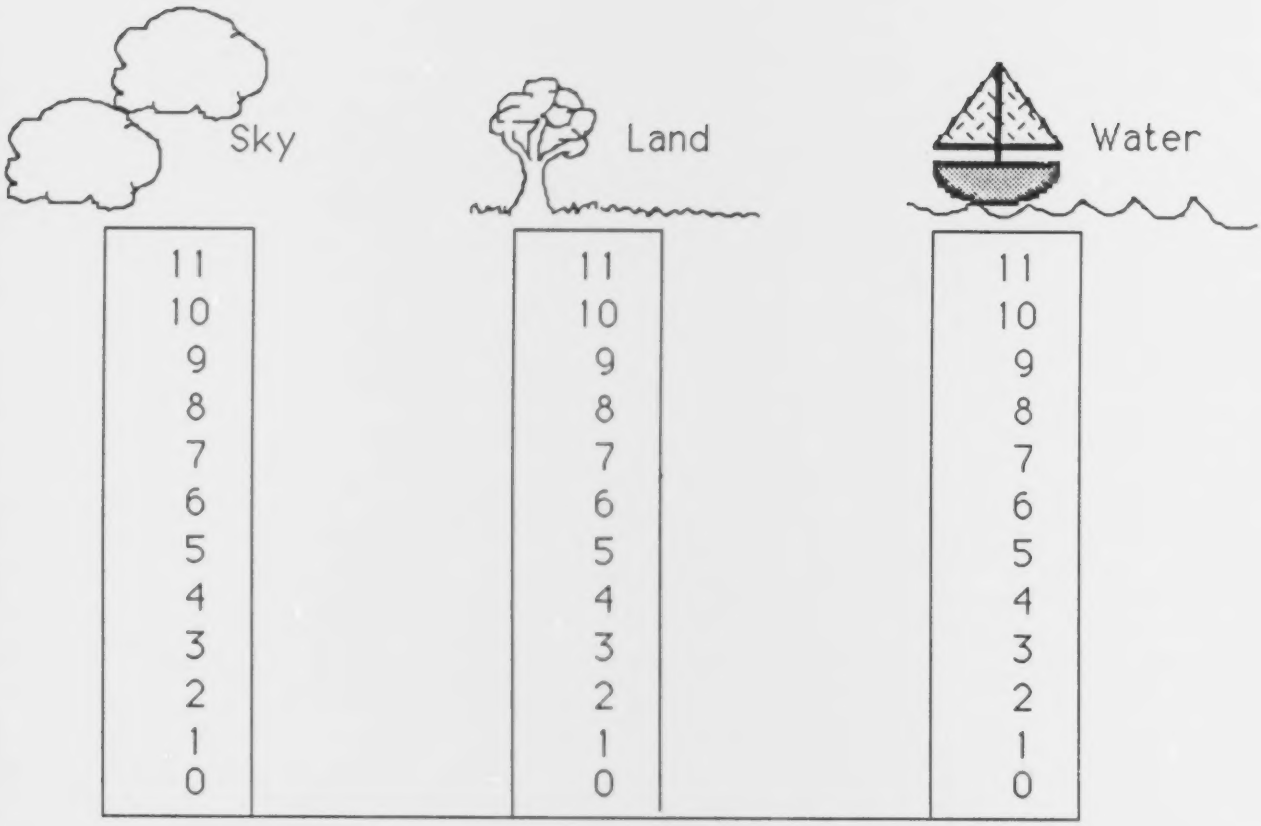
2. Distribute animal cards to the students. Select a student to come forward, identify the animal on his or her card, and place the card in the envelope in the appropriate habitat column. Continue the activity until all animals have been identified and the cards have been placed in the appropriate habitat column.

3. Distribute the handout GRAPH. Ask the students to count the animal cards and graph the number of animals placed in each habitat column. Explain to students that this is an example of a bar graph.

OUTCOME 2 (Continued)

GRAPH
Handout

Name:



GRADE 1
LIFE SCIENCE

UNIT: Animals
TOPIC: Growth and Reproduction
OUTCOME: 3. Understand that all animals grow and reproduce.

Background

Insects change as they grow. Many insects go through four stages of growth. The largest and possibly best known insects, butterflies and moths, are grouped together in the order Lepidoptera. Butterflies and moths have four stages of development: egg, larva (caterpillar), pupa (cocoon or chrysalis), and adult. Most butterfly eggs are laid singly or a few at a time and are unprotected. Many moths lay a large number of eggs in one place and cover the mass of eggs with a protective coating that may include hairs and scales from the females' bodies.

Caterpillars of moths and butterflies are very similar in appearance. Both types of caterpillars have chewing-mouth parts, and most have six true legs on the thorax and four to ten unjointed legs on the abdomen. Most moth larvae spin silken cocoons. A few butterfly species spin cocoons, but most form a chrysalis. Inside the covering, the cocoon or chrysalis slowly changes. When this growth is completed, the adult emerges. When the wings dry, the butterfly or moth will fly.

Butterfly and moth cocoons are needed for this activity. Cocoons may be found on twigs of plants. Cocoons/chrysalis may be purchased from a biological supply company. Pictures of butterflies and moths should be gathered and placed in the classroom. Pictures of various other animals during growth cycles are needed in this activity.

Materials

- Pictures: butterflies and moths
- Marker
- Butterfly cocoons
- Moth cocoons
- Open cardboard box
- Water
- Pictures: reptiles, amphibians, mammals, birds, and fish in various stages of growth

For each student:

- Handout: BUTTERFLY AND MOTH, STAGES OF GROWTH

OUTCOME 3 (Continued)

Procedures

1. Distribute to each student the handout BUTTERFLY AND MOTH, STAGES OF GROWTH. Discuss with students how an insect changes as it grows. Present the following information:

   a. Insect eggs may be found on leaves that provide food for insects after hatching occurs. The egg is the first stage of growth.

   b. After hatching, the young butterflies and moths are called larvae (caterpillars). The larva is always hungry and constantly eats leaves. This is the second stage of growth.

   c. After time passes, the larva stops eating and makes a covering for itself. The insect is now called a pupa (cocoon, chrysalis). This is the third stage of growth.

   d. Inside the covering, the pupa slowly changes. When growth is completed, the adult emerges. When the wings dry, the butterfly or moth flies. This is the fourth stage of growth.

   Tell students that some insects which change in this manner are butterflies, moths, and beetles. Emphasize that when changes are complete, the adult insect emerges. The adult insect looks like other adults of its kind and begins to reproduce.

2. Display pictures of butterflies and moths.

3. Display cocoons of butterflies and moths in an open cardboard box.

4. Sprinkle the cocoons with a little water, and turn the cocoons once a week.

5. Have students observe changes as growth takes place.

6. Have students continue to observe cocoons until an adult emerges. (The time for this process to occur will vary.) Caution students not to touch the organism as it is emerging, since this may damage the wings.

7. Have students release the adult moths and butterflies outside.

OUTCOME 3 (Continued)
Procedures (Continued)

8. Discuss with students that all animals grow and reproduce. Explain that most animals come from eggs and that some animals produce young from eggs hatched inside the female's body. Tell students that mammals give live birth.

9. Present pictures of the growth cycles of several reptiles, amphibians, mammals, birds, and fish. Have students compare these growth cycles to those observed in butterflies and moths.

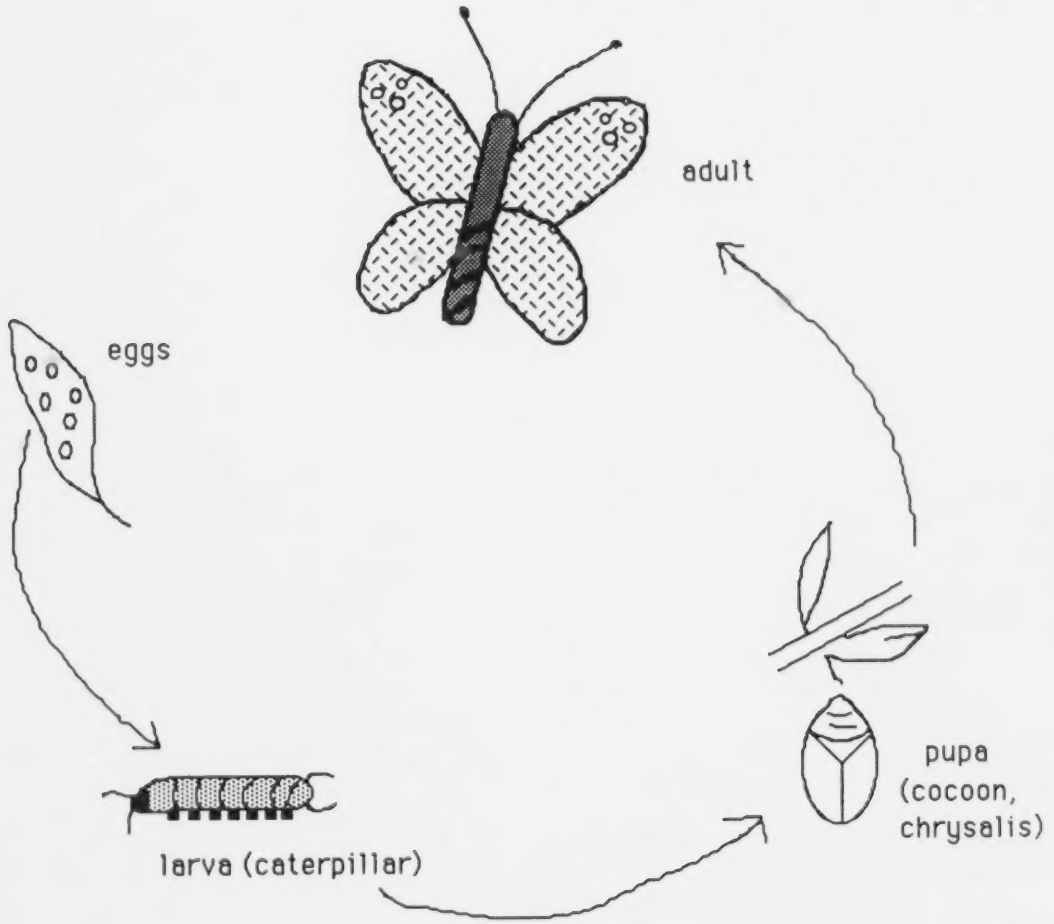
Extensions

Display pictures of the students as babies and at the present time.

Display pictures of various animals as babies and as adults (including humans).

OUTCOME 3 (Continued)

BUTTERFLY AND MOTH,
STAGES OF GROWTH
Handout



GRADE 1
LIFE SCIENCE

UNIT: Animals
TOPIC: Growth and Reproduction
OUTCOME: 4. Classify similarities and differences between parents and their young.

Background

Newborn and young animals usually have larger heads in proportion to their bodies than adults. Newborn and young animals also have bigger eyes, less pronounced noses, muzzles, beaks, and smaller limbs in proportion to adults.

A collection of animal books and posters are necessary for this activity. The "Baby Animal" card game may be constructed by collecting pictures of baby and adult animals and gluing the pictures to separate index cards. Laminate or use clear adhesive-backed paper on the index cards for durability.

Materials

- Books and posters of animal babies and adults
- Pictures of baby and adult animals
- Scissors
- Index cards
- Glue
- Clear, adhesive-backed paper (optional)
- Photographs of students at various stages of growth
- Photographs of students' parents
- Chart paper
- Marker
- Yardstick
- Scale

Procedures

1. Provide students with pictures from posters and books showing the growth of various animals. Emphasize that some young animals look very much like their parents at an early age (colt-horse) and that some animals are quite different in appearance (tadpole-frog).

2. Introduce the "Baby Animal" card game. Distribute young animal cards to each student. Show an adult animal card, and request that the student with the matching young animal card come forward. If the match is correct, allow the student to keep the two cards until the end of the game. Continue the game until all adult cards have been shown. Determine the winner(s) as being the student(s) with the most cards.

3. Display the animal cards in the classroom. Discuss the differences in the young and adult animals.

OUTCOME 4 (Continued)
Procedures (Continued)

4. Direct students to explore their family photograph albums to observe how members of the family have changed from infants to toddlers to adolescents. Encourage students to bring photographs to school. Have a "sharing time" of photographs with a discussion of growth changes.

5. Tell students to study pictures of their parents. Have students compare similarities and differences between their parents and themselves.

6. Start a class height and weight chart. Check the chart periodically with the students to compare growth.

GRADE 1
LIFE SCIENCE

UNIT: Animals
TOPIC: Growth and Reproduction
OUTCOME: 5. Explain that all animals need food for growth.

Background

An animal needs food to grow and mature. An animal's body uses food to make blood, enlarge bones, and provide energy so that the animal can grow and survive. Different animals eat different types of food. An animal that eats only plants is called a herbivore. Herbivores may eat roots, leaves, stems, fruits, flowers, or seeds. A carnivore is an animal that eats other animals. An omnivore eats both plants and other animals. A bear is an example of an omnivore. Bears eat berries, fruit, and fish. Some types of mice, fish, and turtles are omnivores. Human beings are usually omnivores, but some are herbivores (vegetarians).

Prepare the chart HERBIVORE, CARNIVORE, OMNIVORE before beginning the activity. Collect pictures of various herbivores, carnivores, and omnivores. Collect pictures of foods.

Materials

- Chart: HERBIVORE, CARNIVORE, OMNIVORE
- Marker
- Pictures of herbivores, carnivores, and omnivores
- Pictures of appropriate food for herbivores, carnivores, and omnivores

Procedures

1. Discuss the role that food plays in the development of an animal's body.

2. Ask students questions such as:

   a. Why do you eat?
      Why do you think other animals eat?

   b. How do you know when to eat?
      How do you think other animals know when to eat?

   c. How do you know what to eat?
      How do you think other animals know what to eat?

   d. Where do we obtain food for human beings?
      Where do we obtain food for animals?

OUTCOME 5 (Continued)
Procedures (Continued)

3. Present to the class the chart HERBIVORE, CARNIVORE, OMNIVORE. Explain that herbivores eat plants, carnivores eat meat, and omnivores eat both plants and meat. Display pictures of herbivores, carnivores, and omnivores. Ask the students to orally identify or select pictures of animals for each category. Write the animal names in the correct columns on the chart, or place animal pictures in the correct columns on the chart. (See the example below.)

HERBIVORE (Plant Eater)	CARNIVORE (Meat Eater)	OMNIVORE (Plant and Meat Eater)
1. Deer	1. Lion	1. Bear
2. Horse	2. Tiger	2. Eastern box turtle
3. Cow	3. Bald eagle	3. Humans
4. Elephant	4. Wolf	4.
5. Giraffe	5.	5.

4. Request that each student choose an animal from one of the categories and orally report to the class concerning the diet of that animal. (This may be a homework or a library assignment.)

5. Ask students to predict what would happen to the animal being discussed if its food source were no longer available due to changes in climate or habitat destruction.

Extension

Divide the class into two groups. Ask group one to operate a herbivore restaurant for animals. Ask group two to operate a carnivore restaurant for animals. Ask each group to give its restaurant an appropriate name, create a menu, and serve "pretend" food to its animal customers. When group one is role-playing, have several students operate the restaurant while the others identify themselves as certain herbivore customers. Have group two observe and later role-play a carnivore restaurant while group one observes.

HERBIVORE, CARNIVORE, OMNIVORE
Chart

HERBIVORE (Plant Eater)	CARNIVORE (Meat Eater)	OMNIVORE (Plant and Meat Eater)
1.	1.	1.
2.	2.	2.
3.	3.	3.
4.	4.	4.
5.	5.	5.
6.	6.	6.
7.	7.	7.
8.	8.	8.
9.	9.	9.
10.	10.	10.

Provide pictures or words for students to place in the correct columns.

deer	cow
lion	bald eagle
bear	elephant
horse	wolf
tiger	giraffe
Eastern box turtle	shark

GRADE 1
LIFE SCIENCE

UNIT: Animals
TOPIC: Environmental Influence
OUTCOME: 6. Describe characteristics of different habitats of animals.

Background

Habitat is defined as the place where a plant or animal naturally lives or grows. A habitat may be a very small area or may cover miles of territory within a given set of climatic conditions.

Prior to beginning this activity, become familiar with the animal life found on the school grounds. The number and kind of animals on a school ground depend on many things. Some factors to be considered are climate, density of the human population, availability of food supply, availability of a suitable habitat for rearing young, and protection from enemies.

Materials

- Bulletin board paper
- Markers
- Crayons
- Chart paper

Procedures

1. Tell students the definition of habitat: the place where a plant or animal naturally lives or grows. Explain to the students that the class is scheduled for a habitat safari.

2. Take the students on a walk around the school grounds. Ask students to find different animals.

3. Return to the classroom. With the students, compile a list of the animals seen on the habitat safari. Discuss questions regarding where the animals might live. Decide which animals would live in habitats such as in logs, in trees, in bushes, in flower beds, under rocks, under ground, or near streams.

OUTCOME 6 (Continued)
Procedures (Continued)

4. Schedule the students for a second habitat safari. Have students locate animals in different habitats, such as the following:

   a. Birds, squirrels, insects--in trees
   b. Bees--on flowers and shrubs
   c. Various insects and lizards--under logs and rocks
   d. Chipmunks--in the ground
   e. Salamanders, frogs, turtles--near streams
   f. Earthworms--in the soil
   g. Spiders--on webs

5. Discuss the characteristics of each habitat. Ask students why various animals would choose a particular habitat.

6. Let students dictate an experience chart (or a class story) about the animals and their habitats.

7. Let students draw a mural on bulletin board paper showing animals and their habitats.

8. Relate animal habitats to places where humans live. Discuss factors that influence humans' choices (climate, density of population, food supply, protection from enemies) of habitats.

Extension

Ask the librarian to suggest suitable books concerning animals and their habitats. Read the books to the students, and make them available for students to study. Try to provide picture books and easy-to-read books.

GRADE 1
LIFE SCIENCE

UNIT: Animals
TOPIC: Environmental Influence
OUTCOME: 7. Observe homes of different animals.

Background

Ants are highly social animals that construct their own homes. Ants live in groups called colonies. All the ants in a colony help and work together. Ants feed each other and fight for each other.

An ant colony lives in a nest. Ants dig a nest in the ground. A nest consists of various rooms and connecting tunnels. The tunnels extend through the mound and deep into the ground. One chamber houses the queen and her eggs. Several rooms serve as "nurseries," where the workers care for the growing young. Some chambers are gathering or resting places for workers. The nest of some ants has rooms in which food is stored and fungi are raised. As a colony grows, the workers enlarge the nest by making more rooms and passageways. (See the diagram ANT FARM PLANS.)

An ant colony may have dozens or millions of members. Each colony has one or several queens. A queen's chief job is to lay eggs. Most members of an ant colony are workers. All workers, like the queens, are females. The workers build the nest, search for food, care for the young, and fight enemies. Males, called drones, live in the nest only at certain times. A drone's only job is to mate with young queens. After mating, the males soon die. The soldier ants protect the nest. (See the handout ANTS FOUND IN THE COLONY.)

The busy life in an ant nest is like a city filled with six-legged citizens. In some ways, ants are like people--working together and helping build a community.

In this activity students observe how ants build and maintain their nest. Observations take several weeks and may be extended throughout the entire year.

Instructions are included for building an ant farm on the diagram ANT FARM PLANS. Ant farms may be purchased from school supply companies.

Certain precautions should be taken when collecting ants. Do not collect fire ants! Fire ants live in mounds, are red in color, and sting. Small black ants are desirable for a collection. Black ants live underground or beneath logs and rocks. Do not mix ants from different colonies in the ant farm. Ants from one colony will fight ants from other colonies.

OUTCOME 7 (Continued)

Materials

- Ant farm, commercial or teacher-made
- Ground-dwelling ants
- Funnel
- Food for ants: bread crumbs, cookie crumbs, pieces of grass, or small pieces of hamburger
- Squeeze bulb
- Water dish
- Water
- Piece of cardboard, 10" x 15"
- Diagram: ANT FARM PLANS
- Tablespoon
- Wide-mouthed jars (3 or 4)

For each student:

- Student journal, notebook, or paper stapled in book form
- Handout: ANTS FOUND IN THE COLONY
- Handout: ANT COLONY

Procedures

1. Present the background information to students concerning ant habitats. Explain how ants build nests.

2. Present or demonstrate the assembly of an ant farm to the class.

3. Place soil in the ant farm during its assembly.

4. Discuss the proper method of ant collecting. Use the following instructions:

   a. Turn over flat rocks or small logs to search for ants.

   b. Scoop the ants into a jar so that ant eggs are included.

   c. Do not damage the ants or the eggs.

5. Take the students outside. Using a tablespoon, collect ants and place them in wide-mouthed jars.

   NOTE: Instruct students that this ant collection is a true ant colony only if a queen is present.

6. Return to the classroom. Using a funnel, pour ants into the ant farm.

7. Fill a water dish by using a squeeze bulb. Add food for the ants.

8. Place the cork in the hole on the ant farm.

OUTCOME 7 (Continued)
Procedures (Continued)

9. Place cardboard against one of the outside pieces of glass. Explain that ants will build nests near the cardboard because they prefer dark areas.

10. Caution students not to place the ant farm in direct sunlight where the temperature may rise and kill the ants.

11. Wait a minimum of one week before removing the cardboard. When observations are to be made, remove the cardboard. Replace the cardboard on the same side when observations are concluded.

12. Provide students with the handouts ANTS FOUND IN THE COLONY and ANT COLONY. Use the handouts as guides to the identifications of the four classes of ants and as an introduction to life inside an ant nest.

13. Guide students in noting the locations of the following rooms in the ant farm:

    a. Nurseries
    b. Rooms where workers gather
    c. Food storage chambers
    d. Queen's chamber(s)
    e. New rooms for expansion

14. Discuss why ants are called social insects.

15. Have students write observations of the ant farm in personal journals.

Extensions

Involve parents in this activity by requesting that a "handy person" volunteer to build the ant farm and demonstrate the assembly.

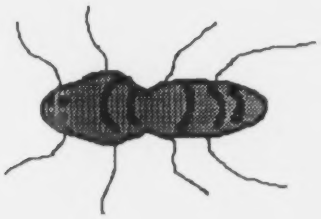
Introduce the term entomologist (scientist who studies insects) to the students. Discuss the science of entomology as a possible career choice. Contact a local university, zoo, or nature center to request that an entomologist visit the students in the classroom. Have students share observations and journals with the "ant expert."

OUTCOME 7 (Continued)

ANTS FOUND IN THE COLONY
Handout

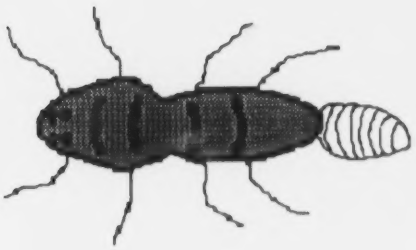
Worker

Work ants dig, hunt for food, and care for eggs.



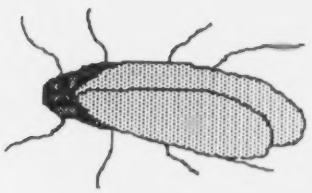
Queen

The queen ant lays all the eggs. She is larger than any other ant in the colony.



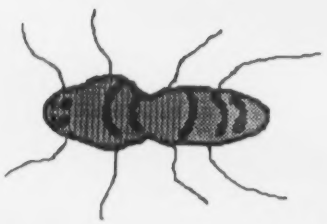
Drone

Drone ants mate with the queen.



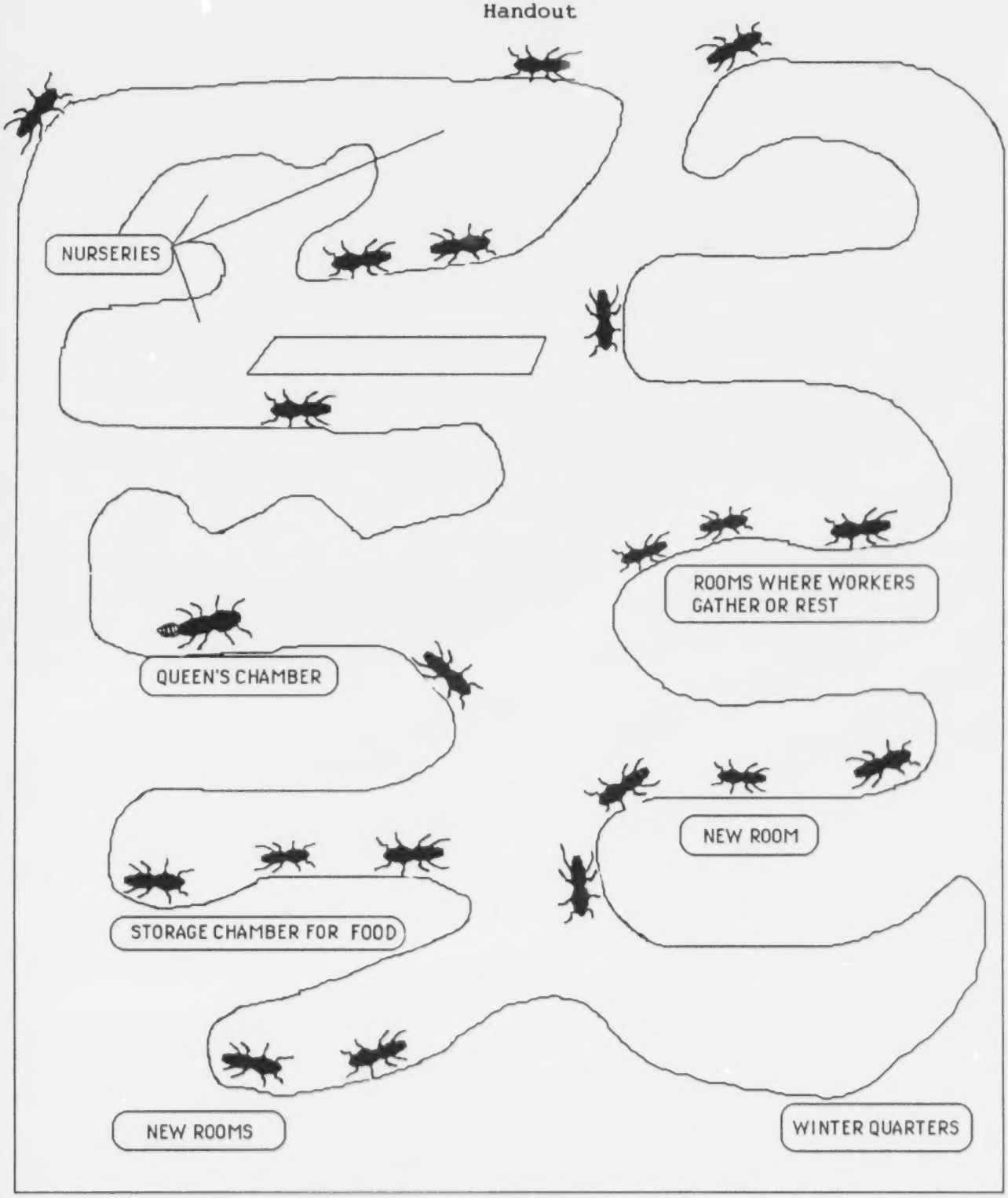
Soldier

Soldier ants protect the nest.



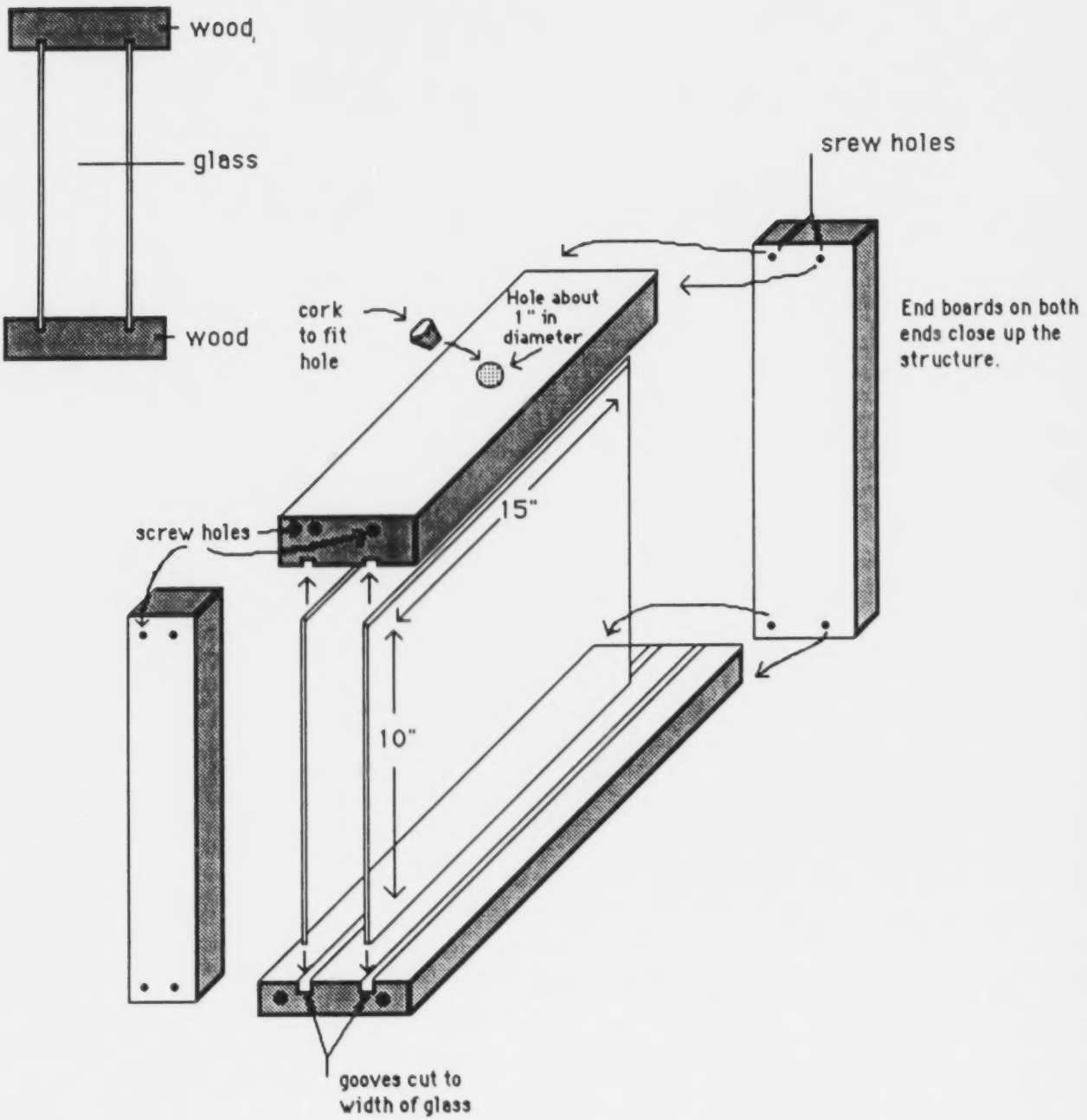
OUTCOME 7 (Continued)

ANT COLONY
Handout



OUTCOME 7 (Continued)

ANT FARM PLANS
Diagram



GRADE 1
LIFE SCIENCE

UNIT: Animals
TOPIC: Effects of Pollution
OUTCOME: 8. Explain harmful effects of pollution on animals.

Background

Litter pollution is unsightly and harmful to animals. Responsible citizens must consider alternatives for reducing the effects of litter pollution on planet Earth.

Materials

For each student:

- Paper bag
- Sink
- Soap
- Paper towels
- Newspaper

Procedures

1. Discuss litter pollution with students. Emphasize that litter is unsightly and may be harmful to animals. Provide the following examples:

   a. Fishing line gets tangled on legs and beaks of water birds, such as geese. The line interferes with the ability to swim, to run short distances, to fly, and to open bills to eat.

   b. Birds and fish get caught in the loop portion of plastic six-pack holders. The animal grows while the loop does not; therefore, the animal suffers and dies slowly.

   c. Animals may cut themselves on cans, pop-tops, or broken bottles.

   d. Injuries may occur as a result of the animals eating pop-tops, cigarette butts, cellophane wrappers, and plastic foam cups. (An ostrich at the Birmingham Zoo choked to death from eating a cellophane wrapper in 1989.)

2. Provide each student with a paper bag. Guide students on a litter hike through the halls of the school and outside to the school grounds to collect litter. Ask students not to remove anything from trash cans. Have students place the litter in their paper bags.

OUTCOME 8 (Continued)
Procedures (Continued)

3. Upon returning to the classroom, select a student to come forward and display the litter collected. Direct the student to empty the litter on a newspaper. Discuss the litter, and guide students in making decisions about which litter is most harmful to wildlife. Permit each student to share his or her litter collection with the class. Have students wash hands after handling litter.

4. Ask students to predict what will happen to animal populations if animals are excessively exposed to litter. Have students brainstorm how they can reduce litter in communities.

5. Discuss students' ideas, focusing on an individual's responsibility as a good citizen to keep the environment litter free.

GRADE 1
LIFE SCIENCE

UNIT: Animals
TOPIC: Use of the Senses
OUTCOME: 9. Discover that sense organs help animals.

Background

Animals have keen senses of hearing, sight, and smell. In most animals other than humans, the sense of taste is not well developed. Senses are essential to animals for locating food, water, and suitable habitats. Animals also use senses for locating one another, for sensing danger, and for sensing territorial boundaries (scent marking).

The olfactory organ (located in the nose) contributes to the sense of smell in many animals. The olfactory nerve carries the sensation of smell from the mucous membranes of the nose to the olfactory lobe of the brain. Olfactory stimuli are important in regulating the social behavior of many fishes and mammals.

Many species of animals have characteristic body odors due to secretions of glands located on various parts of their bodies. Animals use odors to mark territories and to aid in locating their babies. Bats also find food (like flowers and ripe fruits) by using the sense of smell.

In many "nursery" caves, there may be thousands of young bats hanging on the walls, waiting for the return of their hunting mothers. Apparently, many mother bats recognize their young by sound. When females return to the nursery cave, the young bats emit high-frequency sounds. A mother bat seems to know the sound of her own baby. To make sure the mother bat has found the right youngster, the mother also smells and licks the baby. Only after this procedure has occurred is the hungry, young bat allowed to nurse.

During this activity, students will pretend to be bats. Students will use the sense of smell to aid in locating each other.

Prior to this activity, obtain six containers with lids (one for the mother bat and five for the young bats). Acquire five different extracts to provide scents: lemon, banana, orange, peppermint, and vanilla.

OUTCOME 9 (Continued)

Materials

- Film containers, 35-millimeter (6)
- Bottles of extract: lemon, banana, orange, peppermint, and vanilla
- Cotton balls (6)

Procedures

1. Discuss with students how animals use keen senses of hearing, sight, and smell. Emphasize the use of the olfactory organ among bats.

2. Select one student to play the role of bat mother. Select five students to be young bats. (Only one student will belong with the bat mother.)

3. Provide the mother bat with a film container that includes a cotton ball soaked in lemon extract. Distribute the other five containers, each one of which contains a cotton ball soaked in a different extract. Label the bottom of each container with the name of the extract used. Ask the students to refrain from looking at the labels on the containers.

4. Place the mother bat and the young bats on opposite sides of the room.

5. Tell students to role-play bats. (They may emit bat sounds.) Explain that the mother bat must locate her own baby among the others by using her sense of hearing.

6. Tell the students that once the baby has been located by sound, a mother may confirm the identity of her baby by using the sense of smell (lemon-mother bat to lemon-young bat).

7. Direct the five students to lift the lids of the film containers.

8. Tell the mother bat to find the scent that matches her scent. Check to make sure the mother bat finds the lemon scent.

9. Repeat the activity using different students.

10. Discuss why one animal's scent is different from another animal's scent.

11. Discuss why animal mothers respond to their babies' scents.

OUTCOME 9 (Continued)

Extensions

Have the snack for the day consist of peppermint candy, oranges, and freeze-dried banana pieces. Allow the students to sniff the extracts and match them with the snack foods.

Contact the local zoo, university, or nature center to invite a chiroptologist (bat expert) to visit the students in the classroom. Address the prospect of making chiroptology a hobby or career.

For further information on bat behavior and conservation write to:

Dr. Merlin D. Tuttle
Bat Conservation International
C/O Milwaukee Public Museum
Milwaukee, Wisconsin 53233 USA

GRADE 1
LIFE SCIENCE

UNIT: Animals
TOPIC: Use of the Senses
OUTCOME: 10. Predict what life would be like without the five senses.

Background

A sense organ is a specialized structure in which sensory neurons are concentrated. A sense organ functions as a receptor. The eyes, ears, tongue, nose, and skin are sense organs. Sight, hearing, taste, smell, and touch are the five senses. Stimuli from outside or inside the body are received and recognized by the various sense organs.

Prior to the activity, purchase lemon, orange, peppermint, and vanilla extracts. Pour a small amount of each extract onto different cotton balls. Place the cotton balls in labeled (lemon, orange, peppermint, and vanilla) empty film containers.

Materials

- Blindfold
- Cotton balls (4)
- Extracts: lemon, orange, peppermint, and vanilla
- Gloves (1 pair)
- Film containers, 35-millimeter (4)

For each student:

- Clear, plastic wrap
- Banana-flavored ice stick

Procedures

1. Identify the five senses: sight, hearing, taste, smell, and touch. Explain the importance of the five senses to humans and animals. Emphasize that one sense may be more strongly developed than the others. State that this adaptation may aid in locating food and shelter or in communicating with one another in the most efficient manner.

2. Discuss with the students the meanings of predator and prey. (A predator is an animal that captures and eats other animals. A prey is an animal that predators eat.) Emphasize that the predator and prey must use one, several, or all of the five senses to locate food or to avoid becoming eaten.

OUTCOME 10 (Continued)
Procedures (Continued)

3. Have students play a Predator-Prey game. Ask all students to hold hands and form a circle. Chose two students to proceed to the middle of the circle. Have one student serve as a predator and the other student serve as a prey.

4. Ask the predator to pretend to be an eagle and the prey to pretend to be a fish. Ask the class to count to ten as the eagle attempts to catch the fish. If the fish is not caught by the count of ten, explain that the eagle does not obtain its food. Emphasize how the eagle uses its keen eyesight to aid in sighting the fish.

5. Ask students to predict what would happen if the eagle lost its sight. Blindfold the student role-playing the eagle and ask the student to attempt catching the fish. Discuss the importance of keen eyesight in the eagle's ability to survive.

6. Discuss the importance of the sense of hearing to bats. Explain that without the bat's exceptional ability to echolocate (the process of finding the range and direction of objects by the sounds reflected from them), finding food would be much more difficult.

7. Ask the students to form a circle and select two students to role-play a bat and a moth. Blindfold the bat. Ask the bat and moth students to move to the middle of the circle. Ask the bat student to attempt catching the moth student. Have the bat student say "bat" and the moth student respond by saying "moth." Explain that the bat must use a keen sense of hearing to locate the moth.

8. Ask students to predict what would happen if the bat lost its keen sense of hearing. Have students play the game again without having the moth speak. Explain that the bat must catch the moth without the use of sound. Discuss the difficulties bats would face in dark caves without the keen sense of hearing or the ability to echolocate.

9. Discuss how a wolf uses its keen sense of smell to locate food and to sniff "scent markings" that indicate the territory of another wolf. Blindfold a student. Tell the student that four scented cotton balls (lemon, orange, peppermint, and vanilla) will be presented for smelling. Remove the cotton balls from the film containers, one at a time. Ask the student to select the orange scent by using the sense of smell.

OUTCOME 10 (Continued)
Procedures (Continued)

10. Ask the blindfolded student to hold his or her nose and repeat the activity with the othr scents. Help students draw the conclusion that it would be impossible for wolves or people to detect odors without the sense of smell. Have students predict what would happen to the wolf with the loss of its sense of smell.

11. Blindfold a student. Present several objects (small limb, marble, sandpaper, silk), and ask the student to use the sense of touch to indicate if the items are rough or smooth.

12. Place gloves on a student, and have him or her repeat the activity. Emphasize that without the natural sense of touch, the task becomes more difficult.

13. Point out that chimpanzees are members of the ape family, do not have tails, are intelligent and active, and like to play. Explain that chimpanzees are "tool" users. Chimpanzees have been observed to take sticks, poke them into termite nests, and lick the termites off the stick. Ask the students to pretend to be chimpanzees. Provide the students with a banana-flavored ice stick. Ask students to lick the ice stick as the chimpanzee would if the stick were covered with termites. Cover each ice stick with clear, plastic wrap. Ask students to lick the covered ice sticks and determine if any flavor is tasted. Predict what would happen to chimpanzees and humans if deprived of the sense of taste.

Extension

Have students draw an animal of the future. Explain that this animal lost several of its sense organs due to air or water pollution. Have students discuss what life would be like for this new animal.

GRADE 1
LIFE SCIENCE

UNIT: Plants
TOPIC: Kinds of Plants
OUTCOME: 11. Classify plants as to size, color, shape, and texture.

Background

A wide variety of plants are found in any environment. A forest has plants ranging in size from tiny wildflowers to towering trees, in color from the dark green of pines to the white of mushrooms, in shape from the narrow lily to the broad fern, and in texture from the rough bark of a tree to soft moss. Equivalent types of plants showing the full range of characteristics are found in fields, home gardens, or marshlands.

In this activity, students are asked first to decide how plants differ from one another. After differences are established, students are asked to use those identified differences in classifying the plants found in the local environment.

An instant-processing camera, one which instantly develops pictures, will be helpful for recording the kinds of plants found on the nature walk. The nature walk will be equally successful, however, if such a camera is not available.

Fifteen to twenty minutes should be allowed for the nature walk. The time period may be extended if the school is in an environment rich in plant life.

Materials

- Instant-processing camera (optional)
- Film (optional)
- Pictures of 20 to 25 different plants including trees, shrubs, mosses, ferns, and fungi
- Houseplants, varying in size, color, shape, and/or texture (5 or 6)
- Chalkboard or overhead projector

Procedures

Part A

1. Lead the class on a nature walk near the school. Direct students not to pick plants or parts of plants.

2. Use the camera to take photographs of a variety of plants observed on the nature walk. Encourage students to observe carefully the photographed plants.

OUTCOME 11 (Continued)
Procedures (Continued)

3. In the classroom, discuss the similarities and differences of the plants with the students. Make a list of similarities and differences on the chalkboard or overhead projector. Help students focus on the following characteristics: size, color, shape, and texture.

4. Show the pictures taken during the nature walk. Discuss with students how plants in the pictures differ from one another.

Part B

1. Review with the class the concept that plants differ from one another in size, color, shape, and texture.

2. Display the houseplants for student observation.

3. Write the observations made by students on the chalkboard or overhead projector. Emphasize the characteristics of size, shape, color, and texture.

Plant 1	Plant 2	Plant 3	Plant 4	Plant 5	Plant 6
light green smooth leaf	green and white fuzzy leaf	dark green smooth leaf			

4. Help students draw conclusions about how the observed plants differ from one another.

Part C

1. Display the pictures of plants.

2. Have students classify the pictures of plants in a variety of ways, considering only one characteristic at a time. (Students could classify by size: big plants versus little plants; by color: light green plants versus dark green plants; and others.)

3. Discuss with students the characteristics used in each of the classifications. Have students name other plants that are not pictured which could belong in each group.

GRADE 1
LIFE SCIENCE

UNIT: Plants
TOPIC: Growth and Reproduction
OUTCOME: 12. Understand that plants grow and reproduce.

Background

Plants require oxygen, moisture, light, and warmth to grow and reproduce. Germination takes place in plants when these conditions are present.

This classroom activity concerning plants will take one week to complete.

Prior to the activity, prepare self-sealing plastic bags to provide proper drainage. Using a large needle, punch eight to ten holes along the bottom seam of each self-sealing plastic bag.

Materials

- Large needle
- Refrigerator

For each group:

- Self-sealing plastic bag
- Alfalfa seeds (1 package)
- Bowl of warm water

For each student:

- Pita bread (1/4 piece)
- Mayonnaise (1 teaspoon)
- Cucumbers (2 slices)
- Salt

Procedures

1. Divide the class into small groups.

2. Have each group fill the bottom of a prepared plastic bag with one package of alfalfa seeds.

3. Direct students to securely close each bag, place each bag in a bowl of warm water, and leave the bag in place overnight.

4. Ask students to drain the alfalfa seeds and place them in a lighted location (but not direct sunlight).

OUTCOME 12 (Continued)
Procedures (Continued)

5. Have students rinse and drain seeds daily for three or four days.

6. Tell students to place the plastic bags in direct sunlight on the last day.

7. Store bags in the refrigerator overnight.

8. Let each student use the alfalfa sprouts to make an alfalfa sandwich as follows:

    a. Spread one teaspoon of mayonnaise onto one-fourth piece of pita bread.

    b. Add alfalfa sprouts.

    c. Add two cucumber slices.

    d. Sprinkle lightly with salt.

8. Explain that alfalfa plants produce seeds which enable the plant to reproduce.

Extension

Start a seed collection by having students bring to class seeds from fruits, vegetables, and trees.

Label the seeds and have students compare size, shape, color, and texture of the various seeds.

GRADE 1
LIFE SCIENCE

UNIT: Plants
TOPIC: Growth and Reproduction
OUTCOME: 13. Formulate a model of a plant showing the roots, stems, leaves, and flowers.

Background

Many plants have four main parts: roots, stems, leaves, and reproductive organs (flowers, cones, or spores). Most roots grow underground. The root anchors the plant in the soil and absorbs water and minerals that help the plant to grow. The root is one of the first parts of the plant to grow.

Stems support the leaves and other parts of plants. Stems carry water and minerals from the roots to the leaves. Stems also carry food from the leaves to other parts of the plant. Leaves make most of the food that plants need to grow. This process of making food is called photosynthesis. In the process of photosynthesis, energy absorbed from the sun combines with water and carbon dioxide in the presence of chlorophyll to produce food. The food is used by the plant for growth and is stored in the stem or roots. Flowers contain the reproductive parts of flowering plants. Some plants have cones instead of flowers for reproduction. Some simple plants produce spores for reproduction.

Introduce the basic parts of a plant before beginning this activity. Stress the importance of each part of the plant in the life cycle.

Materials

For each student:

- Handout: SUNFLOWER
- Yellow crayon
- Brown crayon
- Glue
- Pre-cut leaves from construction paper (4)
- Green pipe cleaner
- White yarn, 2" pieces (5)

For each group:

- Sunflower seeds (5-ounce cup)
- Die

OUTCOME 13 (Continued)

Procedures

1. Divide the class into small groups.

2. Give each student the materials listed for each student.

3. Give each group the materials listed for each group.

4. Explain the following rules of the activity to each group:

   a. Each student takes a turn rolling the die.

   b. Each student completes the corresponding number on the handout SUNFLOWER only when he or she rolls the die. (The student rolls a two and colors the petals yellow.)

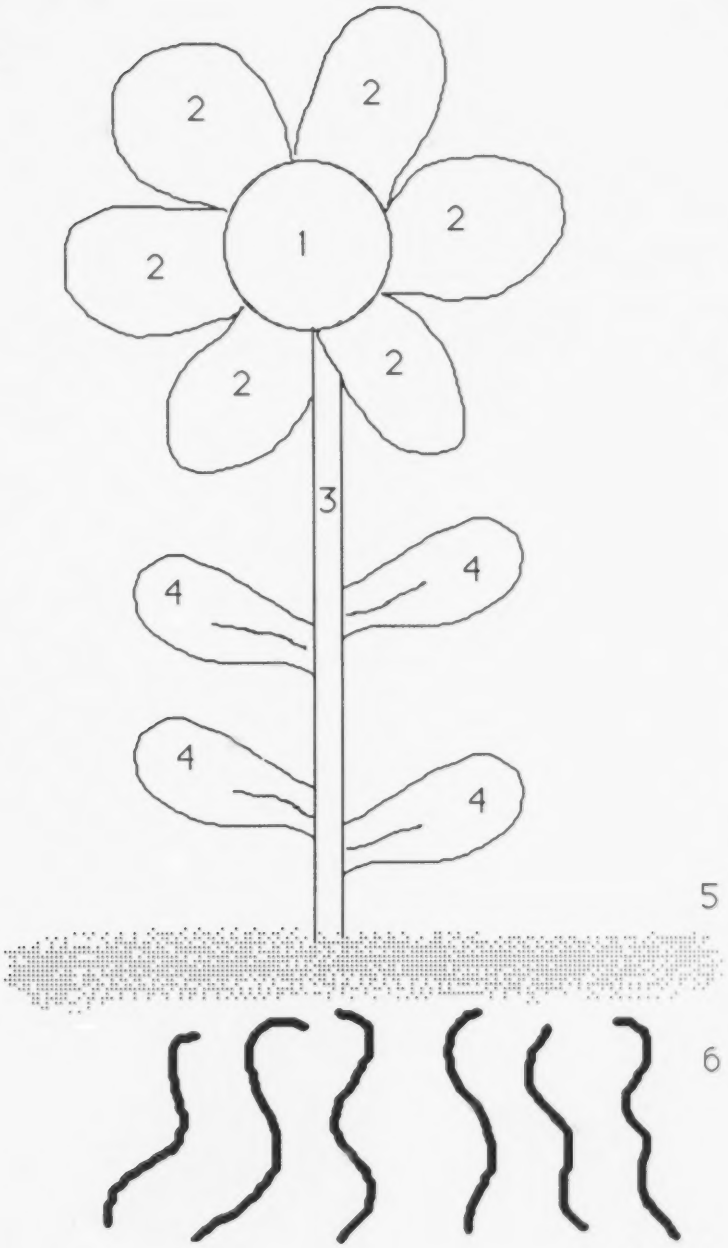
   c. The first one to complete the handout is the winner.

   d. The students continue to roll the die until their handouts are completed.

SUNFLOWER
Handout

Directions:

1. Attach sunflower seeds.
2. Color petals yellow.
3. Attach green pipe cleaner.
4. Attach pre-cut leaves.
5. Color dirt brown.
6. Attach pieces of white yarn.



GRADE 1
LIFE SCIENCE

UNIT: Plants
TOPIC: Growth and Reproduction
OUTCOME: 14. Understand the need for sun, water, soil, and air for the proper growth of plants.

Background

Seeds need proper temperature, moisture, and oxygen to grow into healthy reproducing plants.

Plants are essential as a part of the cycle of nature. Plants supply food and oxygen for other living things.

Prepare one copy of the chart WHAT MAKES A PLANT GROW?

Materials

- Plant pots (4)
- Potting soil
- Marigold plants (4)
- Chart: WHAT MAKES A PLANT GROW?
- Metric ruler

Procedures

1. Have students prepare four plant pots. Direct students to place soil and a small marigold plant in each pot.

2. Label the pots:

   a. Water
   b. No Water
   c. Light and Water
   d. No Light or Water

3. Ask students to water the plant in the pot labeled Water. Tell students not to water the plant in the pot labeled No Water.

4. Direct students to water the two remaining plants. Have students place the plant labeled Light and Water in the sun or in a well-lighted area. Ask students to place the plant labeled No Light or Water in a dark area.

OUTCOME 14 (Continued)
Procedures (Continued)

5. Have students observe the plants for ten days and measure the growth of each plant.

6. For a two-week period, record student observations on the chart WHAT MAKES A PLANT GROW?

7. Have the students dictate a story about plants. Guide the students to include information about what is essential for plant growth: sun, water, nutrients (from soil), and oxygen (from air).

WHAT MAKES A PLANT GROW?
Chart

Beginning Height	____ cm. (a) water	____ cm. (b) no water	____ cm. (c) light	____ cm. (d) no light
First Week MONDAY				
WEDNESDAY				
FRIDAY				
Second Week MONDAY				
WEDNESDAY				
FRIDAY				

GRADE 1
LIFE SCIENCE

UNIT: Plants
TOPIC: Environmental Influence
OUTCOME: 15. Observe and describe different places where plants grow.

Background

Green plants require light (for warmth and for producing food), water, air, and soil. Green plants can be found growing in many places that provide these essential needs. Many plants, such as algae, ferns, and mosses, grow in crevasses and rocks which do not provide a suitable amount of soil for most plants. Algae, ferns, and mosses depend on less soil and more water than some other green plants. Green plants are located in places that provide conditions suitable for growth and the process of photosynthesis.

Preparation for this activity includes scheduling a nature walk around the school grounds or surrounding neighborhood.

Materials

- Instant-processing camera
- Film (2 rolls)
- Small green plant
- Large green plant
- Poster board
- Chalkboard

For each student:

- Permission for a nature walk

Procedures

1. Discuss with students the basic requirements of green plants. (Light, water, air, and soil)
2. List the requirements on the chalkboard.
3. Ask students to describe a green plant observed growing in a yard, in a field, or on school grounds.
4. Ask students to describe the location of the plant (where it is growing).
5. Explain to students that the plants observed are receiving the necessary requirements for growth.

OUTCOME 15 (Continued)
Procedures (Continued)

6. Discuss with students that green plants grow in many different locations. State that some plants grow in very small places while other plants need a large amount of space to grow. Emphasize that whether a plant is small or large, light, water, air, and soil will provide an atmosphere to enrich growth.

7. Show students a small green plant, such as a moss or clover. Display a larger green plant, such as a philodendron.

8. Ask students which plant would need the most light, water, air, and soil.

9. Emphasize to students that different plants require different amounts of light, water, air, and soil needed for growth. Emphasize that green plants can grow in many different places.

10. Prepare the students for the nature walk. Give students the following instructions:

    a. Look for green plants growing in many different places.

    b. Observe carefully.

    c. Do not pick the plants.

    d. Follow class safety rules.

    e. When a plant is located, notify the teacher.

11. Explain to students that a picture record will be kept of the different places plants are found growing.

12. As the nature walk progresses, ask students to look for plants growing in unusual places, such as crevasses, tree bark, sidewalks, buildings, as well as general locations.

13. Take a picture of as many different places as possible where growing plants are located.

14. Emphasize to students that in each location where plants grow, the necessary requirements are present for plant growth.

15. Return to the classroom. Review the different locations where students found growing plants.

OUTCOME 15 (Continued)
Procedures (Continued)

16. Help students mount the photographs taken on the nature walk on a piece of standard-sized poster board.

17. Ask students to label each picture with a description of the location of the plant.

18. Have students decide on a title for the display.

19. Review the concept that green plants can grow in a variety of places, providing the conditions are conducive for growth.

Extension

Let students dictate or write individual science experience stories about the nature walk.

GRADE 1
LIFE SCIENCE

UNIT: Plants
TOPIC: Effects of Pollution
OUTCOME: 16. Explain harmful effects of pollution on plants.

Background

Particulates are tiny droplets of liquid or small particles of metal, dust, and other materials that float in the air. Heavy particulates fall and affect soil and water, thereby affecting the growth of plants. Particulates can travel by wind and can fall to the ground far from their source. Particulates can be absorbed by the soil, water, and plants.

Plants are victims of air pollution. Plant growth can be stunted by pollution, thereby affecting the animals that depend on plant life for food and oxygen.

Air pollution can cause plant diseases. Plant diseases affect the entire plant. Diseases can prevent a plant from conducting photosynthesis.

Materials

- Plastic bags and ties (2)
- Small plants (4)
- Aerosol hair spray
- Vinegar and water solution

For each student:

- Paper
- Pencil
- Crayons (optional)

Procedures

1. Explain to students that aerosol hair spray and a vinegar and water solution are pollutants. Tell students that this activity involves observing and writing about the effects of pollutants on plants.

2. Spray one plant with a pollutant, such as aerosol hair spray.

3. Tie a plastic bag around the sprayed plant and another plastic bag around a second plant.

4. Have students observe both plants for two days and record a description of each plant each day.

OUTCOME 16 (Continued)
Procedures (Continued)

5. Discuss observations with students.

6. Ask students to water a third plant with polluted water (5 percent vinegar and 95 percent water solution). Ask students to water a fourth plant with non-polluted water for a week. Have students observe both plants and record a description of each plant for a week.

7. Discuss observations with students. Emphasize the harmful effects of pollution on plants.

8. Have students draw pictures of what happens to the plants when sprayed with the aerosol spray or watered with the vinegar and water solution. Have students represent the harmful effects of pollution on plants in their drawings.

9. Post the drawings.

10. Discuss how and why responsible citizens should try to eliminate pollution and its effects on plants.

GRADE 1
LIFE SCIENCE

UNIT: Plants
TOPIC: Interdependence of Living Things
OUTCOME: 17. Explain how plants and animals depend on each other.

Background

Trees are suitable habitats for many birds, insects, and mammals. Tree habitats may change with the seasons or because of various environmental influences.

Animals depend on trees for shelter. Birds build nests in trees. Squirrels or other small mammals may build nests in the branches or hollow places in the trunk of a tree. Insects also use trees for shelter and for obtaining food from the leaf fodder.

Trees depend on animals for seed dispersal. Animals help disperse seeds when the seeds stick to the fur or feathers of the animals and are carried to different locations. Some animals eat berries and fruits and do not digest the seeds. Nondigestible seeds are dispersed in the body wastes of animals.

This activity involves the adoption of a "class" tree. The concept of a "class" tree will also be used in Outcome 23.

Materials

- Tape measure
- Tree identification books
- Hand lens
- Chart tablet and marker
- Large sheet of paper
- Tempera paints
- Paintbrushes

Procedures

1. Lead the members of the class on a walk around the school grounds to find a "class" tree.

2. Have the students feel, smell, estimate the size, and measure the circumference or height of the "class" tree.

3. Using elementary tree identification books, have students identify the "class" tree.

OUTCOME 17 (Continued)
Procedures (Continued)

4. Have students observe the "class" tree for evidence of animal life (bird nests, hollow places in the tree where a small mammal could live, small mounds of dirt at the base of the tree indicating the presence of some type of bug or insect). Have students use hand lens for close observations.

5. Record student observations on a chart tablet, stating all animal life observed in and on the tree.

6. Using tempera paints and a large sheet of paper, have the students make a mural of the "class" tree, including the animal life observed in and around the tree. Display the mural in the classroom.

7. Discuss how the tree and animal life are interdependent. (The tree is shelter for the animals, and the animals may help disperse the tree's seeds.)

8. Observe the "class" tree throughout the school year. Have students observe how the "class" tree changes as the seasons change.

Extensions

Have a representative from the local conservation department visit the school and take a core sample from the "class" tree. (The core sample will indicate the age of the "class" tree.)

Help students decorate the "class" tree in winter for the birds. Have students string cranberries and popcorn and attach the string to the "class" tree. Direct students to cut different shapes from bread, cover the bread with peanut butter and bird seed, and attach the bread by yarn to the tree.

Have a birthday party for the "class" tree. Have students sing "Happy Birthday" and eat refreshments under the "class" tree.

Teach students how to make rubbings of the "class" tree's bark.

Have story time under the "class" tree.

GRADE 1
EARTH SCIENCE

UNIT: Space
TOPIC: Energy from the Sun
OUTCOME: 18. Explain that heat and light come from the sun.

Background

The sun sends radiant energy in all directions. Only a small amount of the sun's energy travels to the earth. This small amount of energy heats and gives light to the earth. Without sunlight, the earth would be frozen and lifeless.

Sunlight appears to be colorless and is called white light. White light is really a combination of all true colors of light. When white light shines through drops of water, it is broken or bent into separate bands of light, producing a spectrum. The colors in the spectrum always appear in the same order: red, yellow, green, blue, and violet.

The activities in this lesson are teacher demonstrations, each taking approximately five minutes. The experiments with heat need to be examined at the conclusion or after the lesson.

Materials

- Empty pans (2)
- Metal objects (2)
- Ice cubes (2)
- Flashlight
- Waxed paper cut into cloud shape
- Small mirror
- Water
- Thermometers (2)

Procedures

Part A. Observing the Effects of the Sun's Heat

1. Place one thermometer in a shady location and the other thermometer in a sunny location. After 30 minutes, have students check the temperature on each thermometer. Ask the students which location has the highest temperature.

2. Place an ice cube in each empty pan. Put one pan in the sun and one pan in the shade. After several minutes, let students observe which ice cube is melting faster. Ask students why one ice cube is melting faster than the other ice cube.

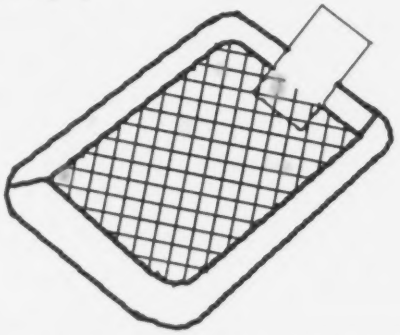
OUTCOME 18 (Continued)
Procedures (Continued)

3. Place one metal object in the sun and the other metal object in the shade. After several minutes, let students touch both metal objects. Ask students which object is warmer and why that object is warmer.

Part B. Experimenting With the Sun's Light

1. In a darkened room, hold the "sun" (flashlight) above the waxed paper "cloud." Explain to students that the sun's light is always shining but cannot be seen on some days because of thick clouds between the earth and the sun.

2. Fill a pan with water. Place a small mirror upright in the pan. Place the pan and water in a very sunny place, making sure sunlight strikes the mirror. Ask students what happens when the sunlight strikes the mirror and is bent by the water? (A "rainbow" will shine on the wall or ceiling.)



Extension

Direct students to write a one-sentence explanation of one of the experiments. Ask students to illustrate the experiment.

GRADE 1
LIFE SCIENCE

UNIT: Space
TOPIC: Revolution of the Earth
OUTCOME: 19. Demonstrate that the earth moves around the sun.

Background

The earth travels in an elliptical path, called an orbit, around the sun and revolves in a counter-clockwise direction. One complete revolution of the earth around the sun takes a year (365 1/4 days).

Materials

- Playground balls (2)

Procedures

1. Role-playing: Let one student represent the sun and stand in the middle of the room. Have another student represent the earth, slowly walking around the "sun" while spinning at the same time. (To be accurate, the "earth" student would need to spin, or rotate, 365 1/4 times each trip around the "sun"; however, decide on a reasonable number of rotations for this role-playing situation.)

2. Earth's Orbit Relay: Divide students into two circles. Have students face the center of the circle. Appoint a captain for each team. Give each captain a ball representing the earth. Starting with a signal, instruct the captains to spin around once and then pass the ball to the right. Have students continue this procedure until each student has had two turns. Explain that this relay demonstrates both the rotation of the earth on its axis and the earth's revolution around the sun. (The entire circle represents the earth's orbit.) Declare the first team that finishes two complete revolutions as the winner.

GRADE 1
LIFE SCIENCE

UNIT: Space
TOPIC: Relationship of Size to Distance
OUTCOME: 20. Observe that larger objects appear smaller when viewed from a distance.

Background

Objects that are far away in distance appear smaller than objects that are closer in distance.

Materials

For each student:

- Pencil

Procedures

1. Ask students to recall large objects they have seen that appeared smaller than the actual sizes of the objects.

2. Have each student take a pencil outside. Have students close one eye and hold the pencil in front of the open eye to "measure" objects in the distance (tree, telephone pole, fence, playground equipment). Ask students the following questions:

   a. What is observed?
   b. Is the pencil really larger than the object observed?

3. Divide the class into pairs. Direct one student to move to the far end of the school ground or playing field. Tell the partner to "measure" that student, using the pencil as in Procedure 2. Have students exchange roles.

Extension

Ask students which is larger--a penny or the moon. Show students how a penny can "cover" the moon on a clear night. (By closing one eye and holding the penny in front of the other eye, the moon can be blocked from view.)

GRADE 1
EARTH SCIENCE

UNIT: Seasons and Weather
TOPIC: Seasonal Changes in Weather
OUTCOME: 21. Describe changes in weather during spring, summer, autumn, and winter.

Background

Seasonal changes take place because of the revolution of the earth around the sun. The tilt of the earth on its axis also plays an important part in seasonal changes. Changes are most apparent in the temperate zone or middle latitudes. Changes in the weather are observable as the four seasons progress. Temperature changes occur due to the slanting direction of the sun's rays on the earth. During the summer, the sun's rays are on a more direct path and the temperatures are hotter. In winter, the sun's rays are more slanted. The more slanted sun rays cover a larger portion of the earth, causing heat to be diffused. The length of days are a factor in temperature. In winter the days are shorter, and the sun has less time to heat the earth. In summer the amount of sunlight increases, and temperatures are hotter as the sun has more time to heat the earth.

Materials

- Pictures depicting the four seasons
- Chalkboard

For each student:

- Handout: SPRING AND SUMMER
- Handout: FALL AND WINTER
- Crayons

Procedures

1. Display pictures of the seasons. Ask students to observe the pictures closely.

2. Ask students to describe each picture.

3. Explain to students that the pictures show the four seasons experienced during a year. (Spring, summer, fall, and winter)

OUTCOME 21 (Continued)
Procedures (Continued)

4. Tell students to observe the pictures again and describe the following:

   a. How does each season make you feel?

   b. What smells do you smell in each season?

   c. What sounds do you hear in each season?

   d. What activities do you participate in during each season?

   e. What special tastes do you think of during each season?

5. Discuss with students that each season has special features that make it unique and different from the others.

6. Direct students to consider how each season makes them feel physically. (Cold, hot, comfortable, chilly)

7. Ask students to describe wearing apparel during fall, winter, spring, and summer.

8. List the responses on the chalkboard under each seasonal heading.

9. Have students discuss why people wear different types of clothing during each season. (Temperatures change with each season.)

10. Instruct students to describe the type weather that usually takes place during each season. (Fall: dry, cool; winter: cold, windy, wet; spring: mild, rainy; and summer: hot, humid)

11. Have students express verbally the changes observed when (a) summer changes to fall, (b) fall changes to winter, (c) winter changes to spring, and (d) spring changes to summer.

12. Ask students if the change from one season to the next season happens suddenly or gradually. (Gradually) Discuss observable clues to the changing seasons.

13. Distribute the handouts SPRING AND SUMMER and FALL AND WINTER to students.

14. Ask students to recall the weather that occurs during each season.

OUTCOME 21 (Continued)
Procedures (Continued)

15. Direct students to use their crayons to dress each figure on the handouts in appropriate clothes for the weather that usually occurs in each season.

16. Ask for volunteers to explain why certain clothing in each illustration is used.

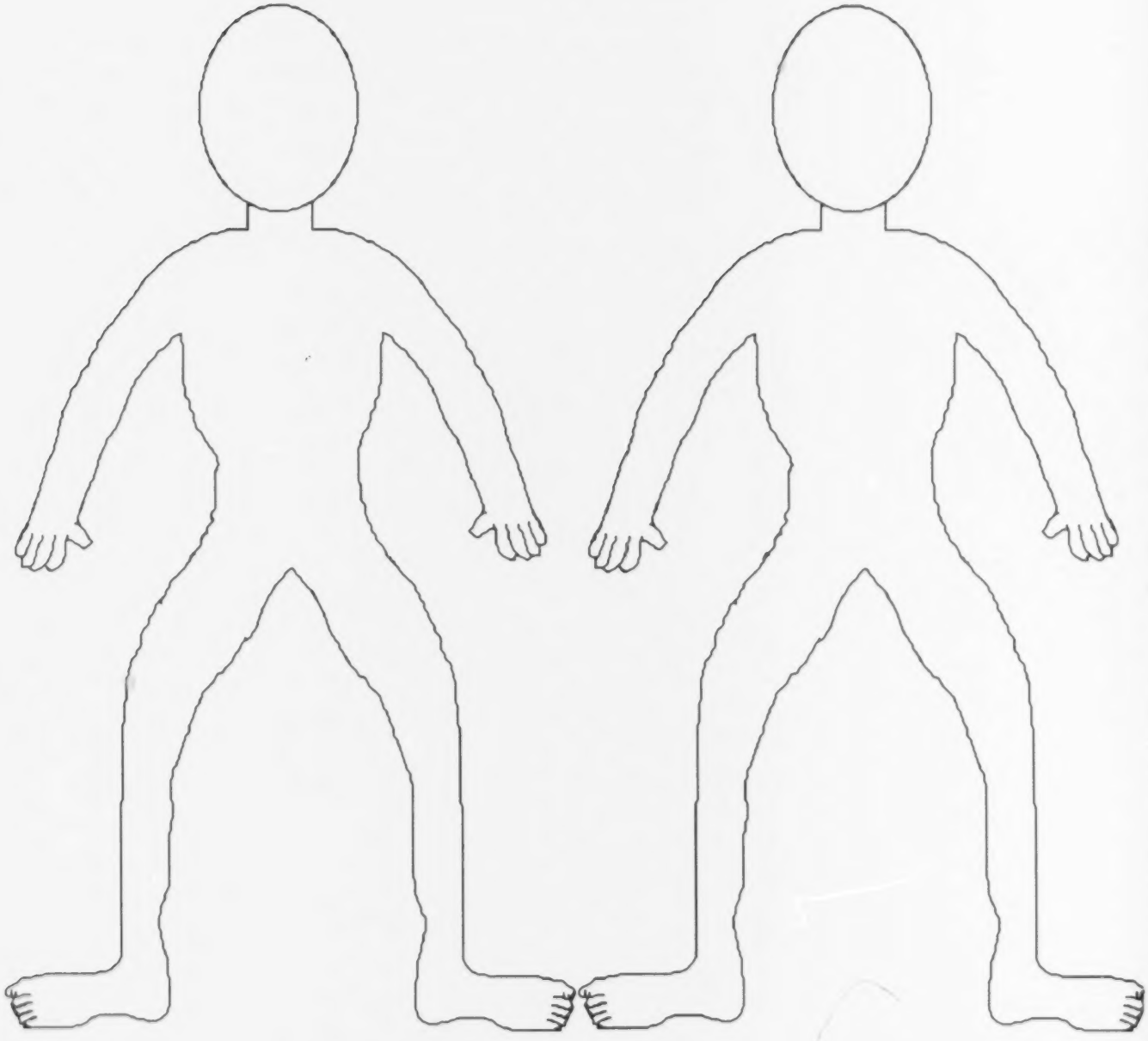
17. Review changes in the weather that occur with the seasons.

Name _____

SPRING AND SUMMER
Handout

Spring

Summer



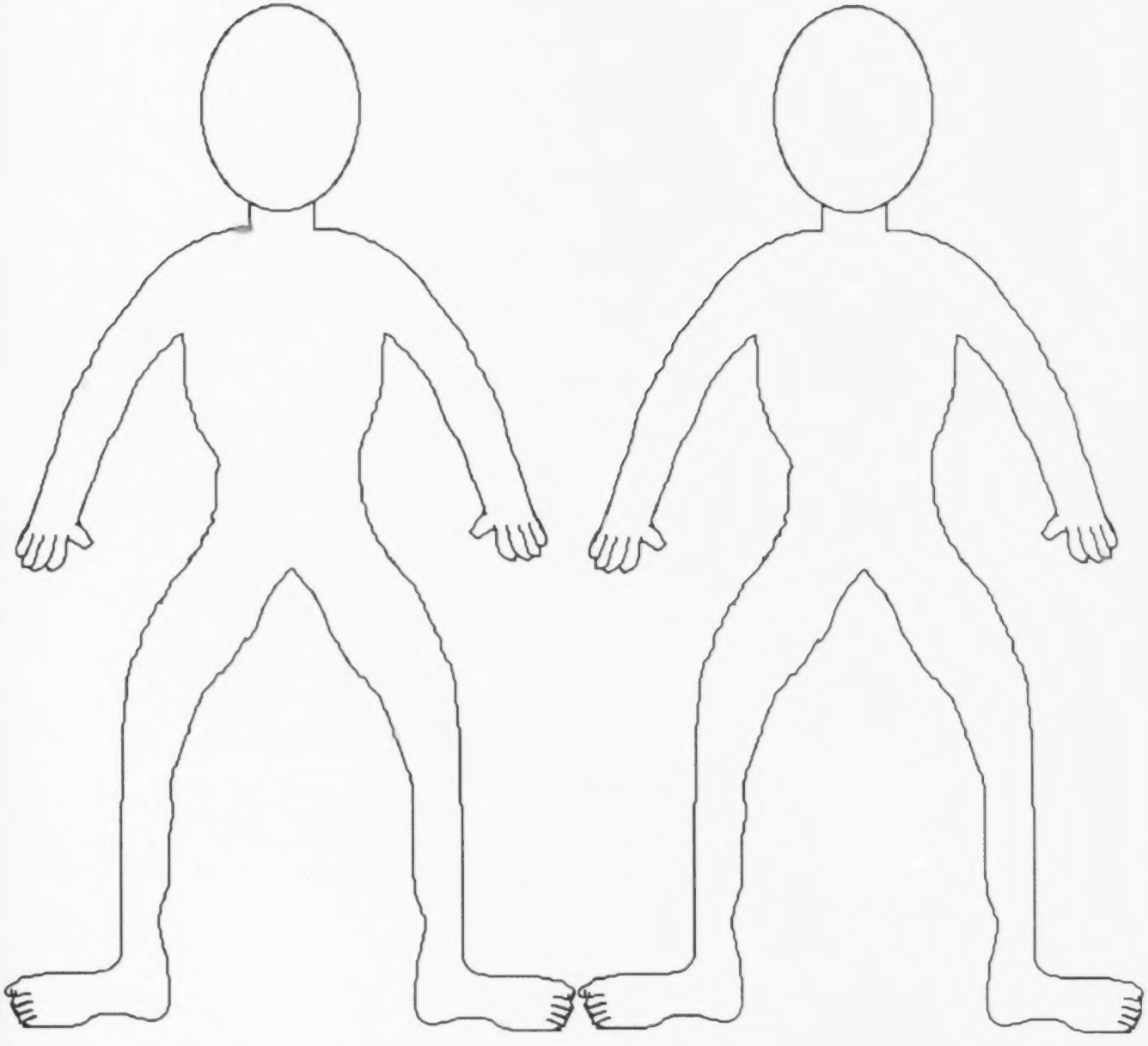
OUTCOME 21 (Continued)

Name _____

FALL AND WINTER
Handout

Fall

Winter



GRADE 1
LIFE SCIENCE

UNIT: Seasons and Weather
TOPIC: Adaptation of Plants and Animals to Seasonal Changes
OUTCOME: 22. Describe changes in plants and animals as seasons change.

Background

There are four seasons: winter, spring, summer, and fall. Winter is the coldest season. In the winter the days are shorter, many animals hibernate (sleep), and many animals migrate (move) to warmer places. Often an animal's coat becomes thicker and changes color in winter. Most plants die or become dormant during winter. Air becomes warmer in spring. Many plants begin to grow, and flowers bloom in spring. Summer days have longer periods of sunlight and are warmer. In the summer, plants grow larger and animals seek cool shelter. In the fall, days are cooler and some plants stop growing. In some places during the fall, leaves change colors and fall to the ground. Animals' fur begins thickening for winter, and many animals gather and store food during the fall.

This activity may last throughout the year. Seasonal pictures of plants, animals, and people are necessary for display. A camera and film are needed.

Materials

- Pictures of plants during each season
- Pictures of animals during each season
- Pictures of people during each season
- Outdoor thermometer
- Chart tablet
- Marker
- Camera
- Film
- Drawing paper
- Pencils
- Bulletin board

Procedures

1. Have students identify the four seasons: winter, spring, summer, and fall. Discuss with students typical seasonal weather patterns, popular seasonal activities of people, and seasonal adaptations of plants and animals. Present seasonal pictures of plants and animals as visual aids during the discussion.

2. Lead members of the class on an observation walk around the school yard. Ask students to observe plants and animals. Take an outdoor thermometer, chart tablet, marker, camera, and film on the walk.

OUTCOME 22 (Continued)
Procedures (Continued)

3. Ask students to select a "class" tree. Tell students that they will visit the "class" tree every two or three weeks. (Do not include evergreen trees in the selection.)

4. Direct the students to explore (investigate) the tree and the surrounding area. Have students examine the bark to look for insects or other animal life in the tree. Ask the students to observe the leaves (if any) and note the color and shape of the leaves. Guide the students in their observations of the surrounding area. Ask the students to turn rocks over, to look for seeds and flowers, and to look and listen for birds and mammals.

5. Gather the students around the "class" tree, and record their nature observations on the chart tablet. Use the outdoor thermometer to measure the air temperature. Record the temperature on the chart tablet. Photograph the class with the "class" tree.

6. Return to the classroom. Provide the students with drawing paper. Ask each student to draw a picture of the "class" tree. Encourage the students to draw the "class" tree as they remember it. Ask students to include any animal life they may have observed in or on the "class" tree.

7. Take the students on an observation walk every two or three weeks. Repeat steps four, five, and six. As the seasons progress, encourage students to note changes as they occur in weather, plants, and animals.

8. Post the "class" tree pictures and class photographs on a bulletin board. Direct students to note changes in patterns of dress in the photographs. Compare student dress changes to the changes in the leaves on the "class" tree. Emphasize that people, domestic and wild animals, and plants make seasonal adaptations. Display pictures of each.

Extension

Direct an art lesson out-of-doors on a warm, dry day. Ask students to lie down on the ground and form "cameras" with their hands. Have students observe the "class" tree from all angles with their "cameras." Ask students to look for various shapes (circles, squares, triangles, and rectangles) formed by the "class" tree branches. Provide pencils and paper. Ask students to draw the "class" tree from many angles. Note changes in the "class" tree during the four seasons.

GRADE 1
EARTH SCIENCE

UNIT: Seasons and Weather
TOPIC: Adaptation of Plants and Animals to Seasonal Changes
OUTCOME: 23. Describe the safety precautions to be used in severe weather.

Background

Severe weather can consist of strong thunderstorms with intense lightning. Under certain conditions, thunderstorms may produce tornadoes. A tornado is a twisting windstorm that is a destructive force. A tornado usually forms along a front between cool air and humid air from the Gulf of Mexico. Most tornadoes occur in the spring on hot, humid days.

A tornado watch is issued when conditions indicate a tornado could occur. A tornado warning is issued when a tornado has been observed. Advisories are broadcasted on radio and television. Sirens are used in some areas as a warning.

A storm cellar offers the best protection during a tornado; a basement offers the next best protection. In a basement, people should crouch under a table. In a building with no basement, people should lie flat under a table or bed that is situated away from windows. Mobile homes should always be evacuated. People should lie (face down) in a ditch if they are outside. In school, people should go to the assigned area in the halls and cover the back of their heads with their hands.

This activity should be preceded by a discussion of safety rules for severe weather. Rules for tornadoes and lightning safety should be included.

The situations on pages 66 through 68 may be assigned to students one day prior to role-playing so that students may collect the suggested materials.

Procedures

1. Divide the class into four groups.

2. Meet with one group at a time to discuss the weather situation the group is to role-play. Use the suggestions following each situation.

3. Assign parts for the role-playing. Have students provide materials and scripts.

4. Provide time for each group to perform its assigned situation.

Situation One

It is a hot, humid day. There are several children at the pool having a birthday party. Everyone is swimming in the pool and having a great time. In the distance, thunder can be heard. After a few minutes, lightning is also visible. What should the children do?

Suggestions

Characters:

- Children
- Mothers
- Lifeguard

Materials:

- Ball
- Whistle

Rules:

- Never stand in water during a lightning storm.
- Seek shelter in a building or car.

Situation Two

There is a neighborhood ball game at the vacant lot near the school. There are many trees nearby. As the game progresses, lightning can be seen, and yet, it is not raining. Someone suggests that all of the people at the ball game go under the large oak tree until the storm passes. What should the people do?

Suggestions

Characters:

- Ball players

Materials:

- Large tree drawn on paper
- Ball
- Mitts

Actions:

- One character makes the suggestion to wait under a tree.
- Other characters offer safer alternatives.

Rules:

- Lightning may strike a tree. Never stand under a tree during a storm.

Situation Three

It has been a hot, humid day, and thunderstorms with possible tornadoes have been announced on a television news report. The family is discussing what action to take if a tornado warning is issued. There is no basement in the family's house. What should the family do?

Suggestions

Character:

- Weather forecaster
- Family members

Materials:

- Flashlight
- Radio

Actions:

- Father or Mother shows the children where to go in case of a tornado warning.
- Father or Mother carries a flashlight and radio to the selected safe area.

Rules:

- Move to the center of the house away from windows.
- Lie under a cushion or protect the body under a piece of furniture.

Situation Four

The principal announces on the intercom the possibility of severe weather. The teacher reminds the students of the procedures during severe weather. In a few minutes, the principal rings a bell, and everyone moves to the designated safe area and covers his or her head.

Suggestions

Characters:

- Principal
- Teacher
- Students

Material:

- Bell

OUTCOME 23 (Continued)

Situation Four (Continued)

Rules:

In the school, go to a designated safe area. Sit with knees against the chest. Place head on knees with hand covering the back of the head.

GRADE 1
EARTH SCIENCE

UNIT: Seasons and Weather
TOPIC: Weather Instruments
OUTCOME: 24. Describe various instruments scientists use to collect data about weather.

Background

Meteorology is the science of studying weather. A meteorologist uses a variety of weather instruments to collect information in order to make forecasts. Meteorologists collect the following information: temperature, air pressure, direction and speed of the wind, humidity, kind and amount of precipitation, and condition of the sky. Instruments used to collect data are the thermometer (measures temperature), the barometer (measures relative humidity), and the rain gauge (measures rainfall).

Part A and Part B should be conducted in two or more teaching days.

Materials

- Guest speaker: meterologist
- Empty translucent jar
- Permanent marker
- Various weather instruments (as listed in the Background) or pictures of weather instruments from reference books

For each student:

- Straight pin
- Pencil with eraser
- Handout: PINWHEEL PATTERN
- Handout: WHAT WILL THE WEATHER BE?

Procedures

Part A: Hearing Firsthand How Weather Forecasts Are Made

1. Invite a meteorologist from the local weather service or television station to bring several instruments (or pictures) used to make weather predictions. Ask the meteorogolist to explain how weather instruments are used to predict the weather.

2. Allow time for students to question the guest about meteorology as a career choice. Have students ask the following questions: What does a meteorologist study? Why would a person want to become a meteorologist?

OUTCOME 24 (Continued)
Procedures (Continued)

Part B: Experimenting With and Predicting the Weather

1. On a rainy day, place an empty translucent jar in an open area outside to collect rainfall. Mark the depth of the precipitation with a permanent marker. Empty the jar. Repeat the procedure on two more rainy days. Have students compare the amounts of rainfall on the three rainy days. Ask students which day had the most rainfall and which day had the least rainfall.

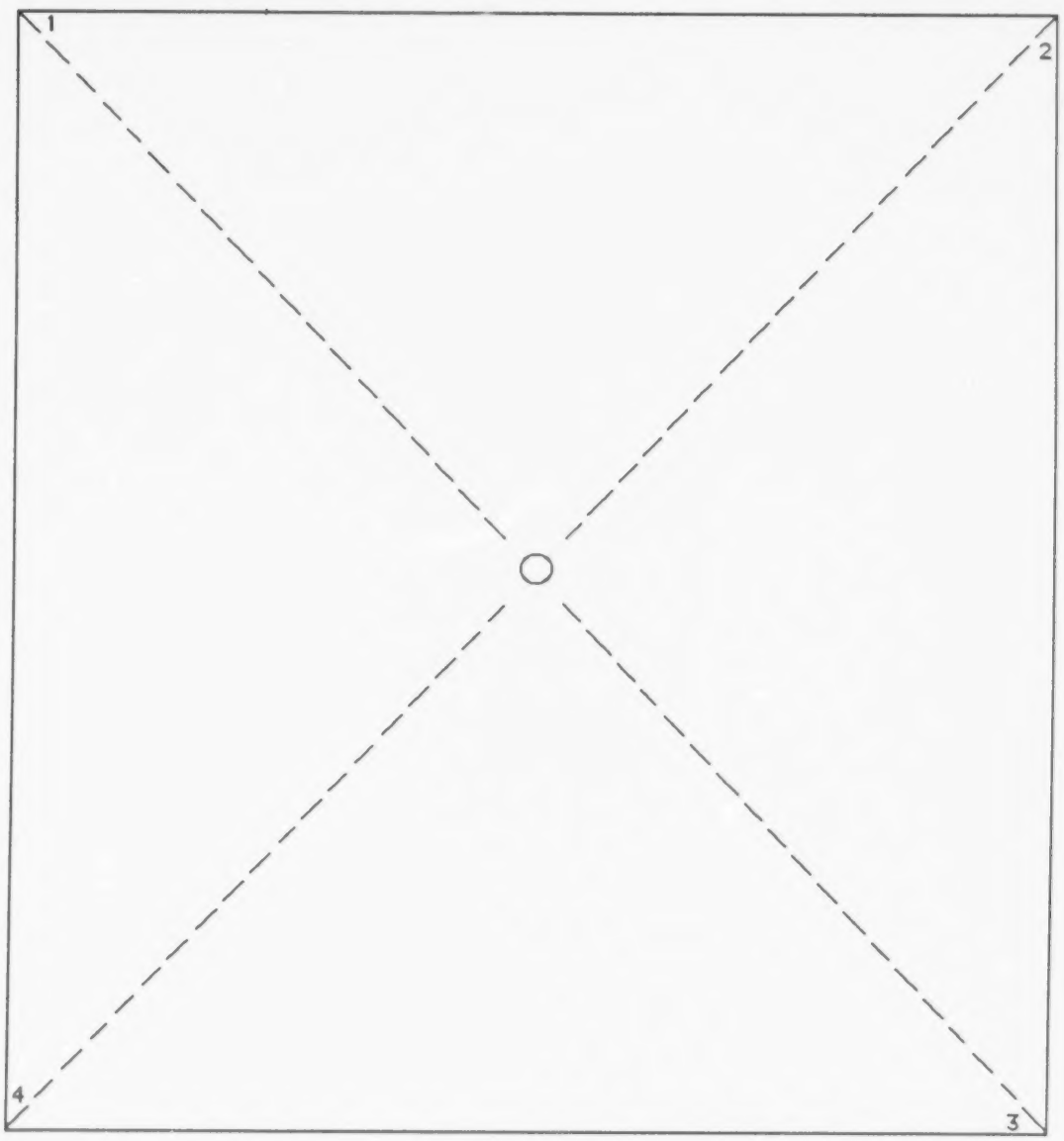
2. Have students make pinwheels by cutting on the dotted lines of the handout PINWHEEL PATTERN. Have students fold the numbered corners into the center. Assist students with pushing pins through the centers of the pinwheels and into the pencil erasers. Lead the students outside with their pinwheels. Have students observe what happens to their pinwheels. Ask students what can be learned about the wind from observations of pinwheels.

3. Let students predict the weather for the next day and write their predictions on the handout WHAT WILL THE WEATHER BE? In the top space, have students draw a picture predicting what the next day's weather will be. Directly below in the space provided on the handout, have students draw a weather symbol showing the actual weather on that day.

Extension

Ask students to watch a weather forecast on television. On the following day, have students role-play and give the weather forecast similar to a meterologist on television.

PINWHEEL PATTERN
Handout



(Reproduce on light-weight paper.)

WHAT WILL THE WEATHER BE?

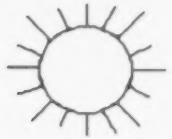
Handout

Meteorologist _____
(Your name)

partly cloudy

snowy

rainy



sunny

windy

cloudy

	Tuesday	Wednesday	Thursday	Friday
Guess				
Actual				

GRADE 1
PHYSICAL SCIENCE

UNIT: Matter
TOPIC: Definition
OUTCOME: 25. Identify different kinds of matter.

Background

Matter is anything that occupies space and has weight. Air, water, wood, rocks, metals, man, plants, animals, sun, stars, and planets are all examples of different kinds of matter.

Materials

- Old magazines
- Small scale
- Ruler
- Several objects that can be easily weighed and measured

For each student:

- Piece of construction paper, 9" x 12"

Procedures

1. Measure and weigh several objects to show that all the objects occupy space and have weight. To weigh a liquid, first weigh an empty container. Then fill the container with water and weigh it again.

2. Instruct students to make a matter collage by drawing and cutting their own pictures; or cut pictures of a variety of materials from magazines, and have them available for students. Instruct students to glue pictures onto a 9- by 12-inch piece of construction paper with the edges overlapping. Have students label their collages MATTER.

Extension

Divide the class into four teams for a scavenger hunt. Give each team the same list of matter to collect (rock, cup of water, stick, leaf, inflated balloon).

GRADE 1
PHYSICAL SCIENCE

UNIT: Matter
TOPIC: Characteristics
OUTCOME: 26. Observe that matter takes up space.

Background

All matter, whatever its form, occupies space. Students observe daily that solids and liquids occupy space. "Seeing" the space occupied by gases is more difficult.

Materials

- Toy block
- Pan of water
- Book
- Several glass containers of different shapes
- Colored water
- Paper napkin
- Tumbler
- Large glass bowl filled with water
- Milk in a carton
- Transparent straw
- Ruler

Procedures

Part A. Observing the Space Occupied by Solids

1. Fill a pan with water. Push a toy block into the water until some water runs over the edge of the pan. Ask students why the water spills. (The block displaces some of the space previously occupied by the water.)

2. Measure a book. Measure the toy block. Ask students which occupies the most space and which occupies the least space.

Part B. Observing the Space Occupied by Liquids

1. Pour colored water into several differently shaped containers. Ask students what is the shape of the water. (The water takes the shape of the container.)

2. Have one student drink milk through a transparent straw. Ask students to compare the shape of the milk in the carton with the milk in the straw.

OUTCOME 26 (Continued)
Procedures (Continued)

Part C. Observing the Space Occupied by Gases

1. Stuff a paper napkin into a tumbler so that the napkin will not fall out when the tumbler is turned upside down. Invert the tumbler, and quickly place it on the bottom of a large glass bowl filled with water by pushing the tumbler straight down. Ask students why the water does not enter the tumbler? (Air is already filling the space inside the tumbler.)

2. Tilt the tumbler slightly. (Air will escape in the form of bubbles.) Ask students to explain the source of the air. (Air comes from the interior of the tumbler.) NOTE: Do not fill the tumbler at such a severe angle that would allow the napkin to become wet.

3. Lift the tumbler straight from the water. Let students observe that the napkin is still dry. Ask students to explain why the napkin is still dry. (Air is still in the tumbler and does not permit the water to occupy the space.)

GRADE 1
PHYSICAL SCIENCE

UNIT: Matter
TOPIC: Characteristics
OUTCOME: 27. Identify characteristics of matter.

Background

All matter has characteristics, called properties, that help differentiate one material from another. There are two kinds of properties: physical and chemical. The physical properties of matter are the ones that are easily observed with the five senses. These include shape, size, color, odor, mass, texture, and temperature.

A solid has a definite size and shape. A liquid has a definite size, but not a definite shape. A gas does not have a definite size or shape.

Part A and Part B should be conducted in two teaching days.

Materials

- Collection of varied materials in large paper sack
- Old magazines
- Posters (4)
- Book
- Water
- Ruler
- Glass
- Glass jar
- Balloon

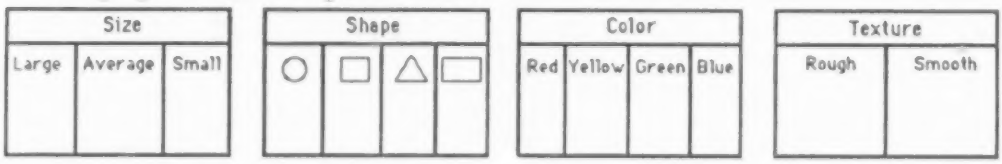
Procedures

Part A. Describing and Classifying Characteristics of Matter

1. One at a time, have students reach into the sack and select an object. Ask the students to describe the object's physical characteristics, such as size, shape, color, texture, mass, and taste.

2. Give each student an old magazine. Instruct students to cut pictures of matter from magazines and classify them by one of the following characteristics: size, shape, color, and texture.

3. Provide four posters, as shown below, on which students may glue their pictures.



OUTCOME 27 (Continued)
Procedures (Continued)

Part B. Experimenting With Sizes and Shapes of the Three Forms of Matter

1. Measure a book. Discuss the book's definite size and shape.

2. Pour water from a glass into a glass jar. Have students observe that size (amount) of water does not change but the water assumes the shape of the container. NOTE: This is a very difficult concept for students to comprehend. Research shows that most students will assume that the amount of water in the larger container is greater than the amount of water in the smaller container.

3. Inflate a balloon. Ask students to observe that the air assumes both the size and shape of its container.

4. Ask students to identify the form of matter for each example:

   book--solid
   water--liquid
   air--gas

GRADE 1
PHYSICAL SCIENCE

UNIT: Matter
TOPIC: Forms
OUTCOME: 28. Explain different forms of matter: solids, liquids, and gases.

Background

Matter exists in three forms: solids, liquids, and gases. NOTE: Matter actually exists in four forms: solids, liquids, gases, and plasma. Plasma as matter is a complex concept to understand. For this activity, use the premise that matter exists in three forms.

Prior to the activity, prepare bulletin board paper for a mural. Label three sections of the paper with the following headings: SOLIDS, LIQUIDS, and GASES.

Materials

- Old magazines

For each student:

- Piece of construction paper folded into three sections, 12" x 18"
- Handout: THE SHAPE OF MATTER
- Card on which one type of matter is written
- Bulletin board paper
- Fish aquarium or picture of acquarium

Procedures

1. Have students observe that three forms of matter are evident in a fish aquarium. Have students identify the solids, liquids, and gases in an aquarium.

2. Give each student a card on which a kind of matter (steam, wood, air, girl, milk, tree) is written. Have students read the cards aloud and tape them to a large mural under the proper headings: SOLIDS, LIQUIDS, and GASES.

3. Direct students to make a triptych by cutting pictures depicting the three states of matter (solids, liquids, gases) from magazines. Have students glue the pictures onto construction paper under the headings SOLIDS, LIQUIDS, and GASES. (Suggestions for gases: sky, steam, inflated balloon)

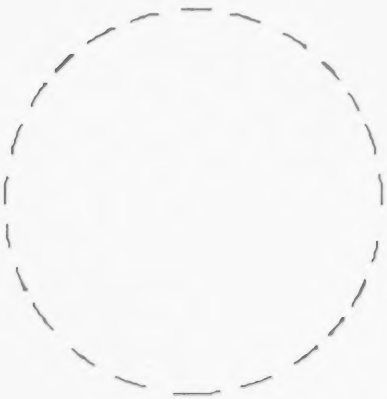
Extension

Tell students to complete the handout THE SHAPE OF MATTER.

OUTCOME 28 (Continued)

THE SHAPE OF MATTER
Handout

Solids can have many shapes. Draw a kind of matter that is shaped like each of these figures. Write the name of the matter on the line.



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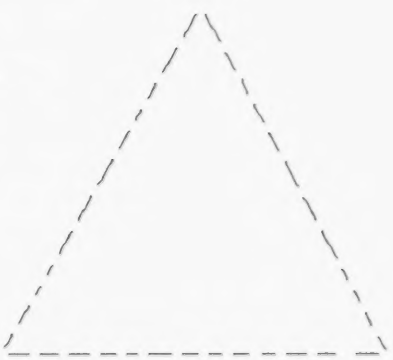

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GRADE 1
PHYSICAL SCIENCE

UNIT: Matter
TOPIC: Changes of Matter
OUTCOME: 29. Explain changes that can occur in matter.

Background

There are two kinds of changes that can occur in matter: physical and chemical. Physical changes may occur in size, shape, or form (liquid or solid). In chemical changes, the characteristics of the substances are altered to form new substances.

Prior to Procedure Two, assign students the responsibility of bringing samples of matter from home before and after undergoing a change. (Suggestions: a kernel of popcorn and a piece of popped corn, an apple and applesauce, a raw egg and a scrambled egg)

Materials

- Paper
- Match
- Samples of changed matter: bread/bread crumbs, sand/glass, butter/cream
- Hot plate
- Pan
- Packages of gelatin (4)
- Bowls (4)
- Mixing spoons (4)
- Scissors
- Refrigerator

For each student:

- Plastic spoon
- Paper cup
- Handout: MATTER CAN CHANGE

Procedures

1. Cut the paper into several pieces. Use a match to burn some of the pieces. When students have seen both types of changes in the matter, ask students to compare the physical change (cutting) with the chemical change (burning) of the paper.

2. Play "Before and After," having each student show the "after" sample of matter for classmates to guess the appearance of the matter before it changed. Demonstrate by using the bread/bread crumbs, sand/glass, and butter/cream samples. Ask students the following questions: Which changes in matter are physical? Which are chemical?

OUTCOME 29 (Continued)
Procedures (Continued)

3. Boil four cups of water. Divide the class into four groups. Give each group a bowl, a stirring spoon, and a package of gelatin. Assist the groups in making the gelatin, allowing each student to stir the mixture. Refrigerate the bowls of gelatin for several hours. Ask the students what type change this experiment represents. (It is a physical change, because the gelatin can return to its original state.)

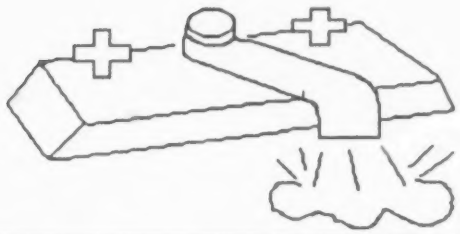
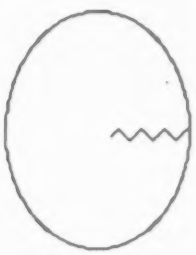
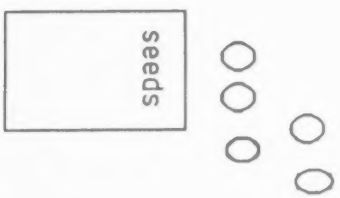
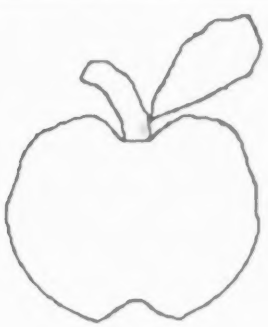
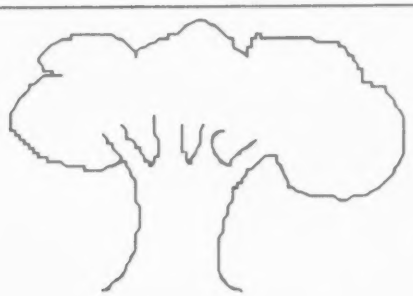
Extension

Have students eat the gelatin made in Procedure 3. Serve gelatin in paper cups.

Give each student the handout MATTER CAN CHANGE. Instruct the students to independently complete the handout MATTER CAN CHANGE.

OUTCOME 29 (Continued)

MATTER CAN CHANGE
Handout

MATTER	HOW IT LOOKS WHEN IT IS CHANGED
	
	
	
	
	

GRADE 1
PHYSICAL SCIENCE

UNIT: Matter
TOPIC: Changes in Matter
OUTCOME: 30. Demonstrate that heat causes water to evaporate.

Background

Evaporation occurs when water changes from a liquid to an invisible gas. Several factors affect the speed of evaporation. Heat affects the speed of evaporation by causing molecules to move faster; therefore, more molecules can leave the water at one time. Fast-moving molecules can rise into the air and become molecules of water vapor.

Materials

- Drops of water (20)
- Pie pans of the same size (2)
- Ice cube
- Hot plate
- Blow dryers (4)
- Small squares of wet cloth (8)

Procedures

1. Place ten drops of water in each pie pan. Place one pie pan in a sunny window and the other pie pan in the coolest area of the classroom. Instruct students to observe which water evaporates most quickly.

2. Place an ice cube in a pie pan. Emphasize the present form of matter of the ice cube. Let the ice melt. Discuss the change in form. On the hot plate, heat the water from the ice cube. Let students predict what will happen to the water when boiling occurs.

3. Divide the students into four groups. Give each group a blow dryer and two wet cloths. Tell each group that it will dry the cloths, one naturally and one with a blow dryer. Ask students the following questions: Which cloth will dry faster? Why? Have students estimate how long each cloth will take to dry.

4. Instruct students to dry the cloths, record results, and report the results to the class.

GRADE 1
PHYSICAL SCIENCE

UNIT: Energy and Machines
TOPIC: Uses of Energy
OUTCOME: 31. Demonstrate that energy is needed to move things.

Background

Energy is defined as the ability to do work. All life depends on the energy of the universe. The sun's rays help plants make food. Animals eat the food in plants and use the food as energy. Energy is stored in coal, oil, and wood, which people utilize to perform work. Running water of rivers produces electrical energy. People use the forces of nature to do work.

Prior to the activity, mount and display pictures in the classroom that illustrate energy.

Materials

- Pictures of objects that move
- Small toy car
- Bulletin board paper
- Magazines
- Glue
- Crayons

Procedures

1. Show students pictures of objects that move. Ask students to tell how the objects in the pictures move.

2. Tell students that energy is defined as the ability to do work.

3. Roll a small toy car across a table. Ask students what makes the car move. (Human energy)

4. Have a student jump. Ask what makes the student jump? (Human energy obtained from food)

5. Have students make a mural of sources of energy on bulletin board paper. Suggest that students use magazine pictures or draw pictures for the mural.

GRADE 1
PHYSICAL SCIENCE

UNIT: Energy and Machines
TOPIC: Uses of Machines
OUTCOME: 32. Discover that machines are used to make many kinds of work easier.

Background

Many activities depend on machines. Machines are devices that do work. A machine produces force but cannot create energy. Machines use many sources to generate energy, such as water, fuels, and the atom.

People have developed a wide variety of machines to meet their needs. During the Stone Age, people made axes that served as tools. As years passed, people discovered other ways to harness energy; thus, machines have become more complex.

All machines are based on six simple machines: lever, pulley, wheel and axle, inclined plane, wedge, and screw.

Materials

- Cake mixes (2)
- Other necessary ingredients for cake
- Bowls (2)
- Spoon (1)
- Timer
- Small electrical mixer
- Electric skillet with cover
- Chalkboard

For each student:

- Paper cup, 5-ounce

Procedures

1. Discuss with students that machines make work easier. Have students name some machines used in homes that make work easier.

2. Place two cake mixes in two separate bowls.

3. Follow directions on the boxes for adding ingredients to both mixes.

4. Using a spoon, have students take turns stirring one cake batter 300 strokes.

5. Time this procedure. Record the time on the chalkboard.

OUTCOME 32 (Continued)
Procedures (Continued)

6. Using a small electrical mixer, prepare the second cake mix.

7. Time this procedure. Record the time on the chalkboard.

8. Lead a discussion concerning which method of mixing makes the work easier, which method takes the least time, and which method requires the least energy.

9. Preheat an electric skillet to 375°. Fill five-ounce paper cups half full with cake mix. Place the cups with batter in the electric skillet. Cover the skillet and bake the cakes twenty minutes. Let cakes cool. Have students peel the paper from the cakes and eat the cakes.

GRADE 1
PHYSICAL SCIENCE

UNIT: Magnets
TOPIC: Kinds of Magnets
OUTCOME: 33. Identify different kinds of magnets: circular, horseshoe, bar, and natural.

Background

Magnets are used in many ways. Tiny magnets are used to store images and sounds on tapes and computer disks. Magnets are used to transmit impulses of sounds in telephones, televisions, and radios. Magnets are used in compasses. Large amounts of electricity are produced with the help of magnets.

Magnets are made in many shapes and have their poles in different places. Every magnet has a special use.
Bar magnets are used in a compass. Some doors are fastened with the help of bar magnets. Tiny bar magnets compose the magnetic powder used on tapes and disks.

A horseshoe magnet is a bar magnet bent into the shape of a horseshoe. Bringing the poles together makes a stronger force field. Horseshoe magnets are used in small electrical motors.

Circular magnets resemble small doughnuts. They do not have poles. Circular magnets are used in electronic computers. Disk magnets have one pole around the edge and the other pole in the center. Disk magnets are used in radio and television speakers.

A natural (loadstone) magnet is a rock that contains an iron-based material that has been magnetized.

Permanent magnets are made of steel or mixtures of iron, nickel, and cobalt.

NOTE: Magnets may be demagnetized in two ways. A sharp blow, such as dropping the magnet on a table or floor, and storing magnets pole to pole will demagnetize a magnet.

Materials

- Magnet: bar, circular, horseshoe, and natural (loadstone)
- Chart paper
- Bottle of colored sprinkles

For each student:

- Graham cracker (1/4 cracker)
- Peanut butter (1 teaspoon)

OUTCOME 33 (Continued)

Procedures

1. Display an example of a bar, a circular, a horseshoe, and a natural (loadstone) magnet. Discuss the names of each magnet, and show the students an example of how each magnet is used.

2. Ask students to discover ways magnets are used in the classroom. Make a list on chart paper. Have studednts identify each kind of magnet as a bar, a circular, a horseshoe, or a natural fmagnet.

3. Have students participate in a scavenger hunt to discover different ways magnets are used in homes.

4. On the next school day, add the home lists to the classroom list of ways magnets are used. Have students identify each kind of magnet as a bar, a circular, a horseshoe, or a natural magnet.

5. Have each student make a bar magnet snack using the following recipe:

   1/4 graham cracker
   1 teaspoon butter
   Sprinkles, colored

   Spread peanut butter on graham cracker.
   Dip each end of graham cracker in different colored sprinkles. (Explain to students that this represents the North and South poles of the bar magnet.)

6. Provide time for students to eat their bar magnet snacks.

GRADE 1
PHYSICAL SCIENCE

UNIT: Magnets
TOPIC: Magnetic Force
OUTCOME: 34. Explain that magnets have various levels of magnetic force.

Background

Magnets vary in many ways. Magnets have different shapes: bar, circular, horseshoe, and cylindrical. Magnets are different sizes, ranging from the small magnets that hold messages on the refrigerator to the huge magnets that pick up heavy chunks of iron in a junk yard. Magnets vary in strength, or magnetic force, ranging from magnets which pick up no more than a pin to those which pick up an entire car.

In this activity, students investigate a variety of magnets and discover that magnets vary in strength. Because young students tend to concentrate on only one characteristic at a time, it is necessary that the magnets vary only in strength and not in size or shape. If too many different characteristics are presented at one time to students, they may focus on the differences of the magnet as the cause of the activity results, rather than on the strength of the magnet.

Prior to the activity, label the Magnets A, B, C, and D. Prepare the handout DATA SHEET. Use the data sheet model illustrated at the end of the activity as a guide in preparing the handout.

Students participating in this activity should already have experience with the kinds of materials a magnet will attract.

Materials

- Chalkboard or overhead projector

For each pair of students:

- Magnets of differing strengths but the same size and shape (4 or more)
- Steel paper clips (15 to 20)
- Handout: DATA SHEET

Procedures

1. Discuss with students examples of the word strong. Ask students if every person is as strong as every other person. Discuss how some people are stronger than others.

OUTCOME 34 (Continued)
Procedures (Continued)

2. Display one of the sets of magnets to be used in the activity. Ask students to predict if all of the magnets will have the same strength. Record the predictions on the chalkboard or overhead projector.

3. Tell students to test the predictions. Give the following directions:

   a. Obtain a set of magnets, paper clips, and data sheet.

   b. Put the paper clips into a pile on a disk.

   c. Start with Magnet A. Push one end of the magnet into the pile of paper clips. Pull the magnet up and out from the pile of paper clips.

   d. Remove the paper clips that are attracted to the magnet. Count the paper clips.

   e. Record the number of paper clips that were attracted to Magnet A on the DATA SHEET.

   f. Repeat steps c through e with each of the other magnets.

4. Discuss the results of the activity with the students. Help students draw the following conclusions:

   a. The magnets attracted different numbers of paper clips.

   b. Since the magnets attracted different numbers of paper clips, they have different strengths.

5. Return to the predictions made at the beginning of the activity, and determine whether the predictions are correct or incorrect.

Data Sheet
Handout

Name _____

Magnet A

_____ paper clips

Magnet C

_____ paper clips

Magnet B

_____ paper clips

Magnet D

_____ paper clips

GRADE 1
CONTRIBUTIONS AND CAREERS IN THE FIELDS OF
LIFE SCIENCE, EARTH SCIENCE, AND PHYSICAL SCIENCE

UNIT: Contribution and Careers in Science
TOPIC: Contributions of Scientists
OUTCOMES: 35. Identify men and women who have contributed to the fields of Life Science, Earth Science, and Physical Science.

36. Describe what men and women have done in the fields of Life Science, Earth Science, and Physical Science.

37. Explain why an understanding of Life Sciences, Earth Sciences, and Physical Sciences can contribute to the quality of life in today's and tomorrow's society.

TOPIC: Career Opportunities
OUTCOMES: 38. Identify careers related to an understanding of Life Sciences, Earth Sciences, and Physical Sciences.

39. Explain how careers depend on a basic understanding of Life Sciences, Earth Sciences, and Physical Sciences.

Background

The goal of science education should be to develop scientific literacy through a balanced science curriculum that prepares students to (1) pursue further studies in science and technology, (2) participate in a technological society of informed citizens, (3) enter the modern work world, and (4) develop intellectually and morally to their fullest. ("The New Basic in Education: Sciencing" taken from an interview given by Dr. Gerald Krockover, Professor of Geosciences and Education, Purdue University.)

Building more realistic images of scientists may help students become interested in choosing careers in science. The stereotypical image of a scientist as a man in a white lab coat must be broadened. A scientist may be a parent, a neighbor, or a teacher. In short, a scientist is anyone who studies a problem using the scientific method of research in gathering data, conducting experiments, making observations, and testing results.

OUTCOMES 35, 36, 37, 38, and 39 (Continued)
Background (Continued)

Biographical data on scientists included in this section of the curriculum guide may be helpful with activities that address contributions and careers in the fields of Life Science, Earth Science, and Physical Science. Biographical data may be expanded to include many other scientists. The information about each scientist may be stored in a biographical data file. The procedures below describe how to construct a biographical data file.

Materials

- Shoe box
- Adhesive-backed paper
- Index cards, 5" x 8"
- Tabs or markers
- Biographical Data: LUTHER BURBANK
- Biographical Data: SIR FRANCIS BEAUFORT
- Biographical Data: SIR ISAAC NEWTON

Procedures

Make a biographical data file of famous scientists. Transfer the biographical data of Luther Burbank, Sir Francis Beaufort, and Sir Isaac Newton onto 5- by 8-inch index cards. Separate the index cards into three categories: Life Sciences, Earth Sciences, and Physical Sciences. Use tabs to indicate category separations, or use markers to color-code corners of the index cards (Life Sciences--red, Earth Sciences--blue, Physical Sciences--green). Cover a shoe box with colorful adhesive-backed paper. Use the shoe box as a container for the biographical data cards. Use the biographical data file with each activity concerning contributions and careers of scientists.

LUTHER BURBANK (1849-1926)
Biographical Data

Luther Burbank was born in 1849 in the United States. As an American naturalist, he is best remembered for having developed over 800 new varieties of flowers, fruits, vegetables, and trees. To develop these new varieties, Burbank crossed two different plants by placing the pollen from one stigma of a flower to the pollen of a stigma from a different flower. He usually grew thousands of plants in his effort to produce one, newly-improved species. (Some famous hybrids developed from Burbank's work are the Russet potato and Shasta daisy.) Each year Santa Rosa, California, holds a festival to honor Burbank.

NOTE: Although Burbank used scientific principles and methods, his main interest was in practical results.

SIR FRANCIS BEAUFORT (1774-1857)
Biographical Data

The Beaufort wind scale is often used to indicate wind velocity. The scale was introduced by Sir Francis Beaufort, an English admiral, in the first decade of the nineteenth century. He based the scale on the force with which the wind blew on the sails of a vessel. Beaufort divided winds into thirteen different classes on the basis of their speed and gave a code number (from 0 through 12) to each. Later, the scale was modified to apply to a definite range of wind speeds.

SIR ISAAC NEWTON (1642-1727)
Biographical Data

The noted English natural philosopher, astronomer, physicist, and mathematician Sir Isaac Newton developed the theory of gravitation and formulated the three basic laws of mechanics, Newton's Laws of Motion. While at his mother's farm, the young Newton observed an apple falling to the ground, causing him to wonder whether the same force that pulled the apple down also held the moon in place.

OUTCOMES 35, 36, 37, 38, and 39 (Continued)

Background

Luther Burbank was one of America's most famous naturalists. This activity acquaints students with the work and accomplishments of Burbank. Become familiar with the biographical information provided on Luther Burbank on page 93 or in the previously-prepared biographical data file before beginning this activity. Purchase bean seeds, plastic foam cups, plastic wrap, gravel, and potting soil in advance. Soak the bean seeds for this activity in water overnight. Thrust three small holes through the bottom of six plastic foam cups to allow for drainage. Prepare the chart BEAN GROWTH prior to the activity. (See the attached chart format.)

This activity requires a small amount of class time for five consecutive days.

Materials

- Biographical Data: LUTHER BURBANK (1849-1926)
- Chart: BEAN GROWTH
- Plastic or metal drainage tray
- Ruler
- Blue award ribbons

For each group:

- Plastic foam cup
- Bean seed
- Tablespoon
- Potting soil
- Plastic wrap
- Water
- Gravel

Procedures

1. Discuss with students the biographical information on Luther Burbank.

2. Celebrate Mr. Burbank's contributions to science by having students participate in a "Bean Race." Place students in six groups, and explain that each group will attempt to grow the tallest bean plant.

3. Provide each group with a cup (labeled with a group number one through six) and the other materials listed for each group. Emphasize the importance of working together as a team. Ask each student in the group to perform one of the following tasks:

   a. Pour two tablespoons of gravel into a cup.

   b. Fill the cup with potting soil.

OUTCOMES 35, 36, 37, 38, and 39 (Continued)
Procedures (Continued)

c. Bury the soaked bean seed just below the surface of the potting soil.

d. Place the cup on the drainage tray.

e. Sprinkle two tablespoons of water on the soil. (Water this amount daily.)

f. Cover the cup with plastic wrap.

g. When a sprout appears, remove the plastic wrap.

(All plant cups should remain in the same location and grow under the same conditions.)

4. Explain to students that the variables being controlled in the activity are amount of soil, size of pot, number of plants, exposure to sunlight, and amount of water. After a sprout appears, ask students in each group to decide which selected variable to change (exposure to sunlight, amount of water).

5. Record on the chart BEAN GROWTH the variable each group voted to change. Announce that the "Bean Race" will begin and will last for five days after the sprout appears.

6. Measure the height of the bean plants daily with a ruler. Record the measurements on the chart BEAN GROWTH.

7. Award blue ribbons to the students in the group with the tallest bean plant.

BEAN GROWTH
Chart

Bean Plant	Variable	Day 1	Day 2	Day 3	Day 4	Day 5
1						
2						
3						
4						
5						
6						

Record daily growth rate in inches.

Outcomes 35, 36, 37, 38, and 39 (Continued)

Background

Sir Francis Beaufort was a famous English admiral. This activity acquaints students with the work and accomplishments of Beaufort. Become familiar with the biographical information provided on Sir Francis Beaufort on page 93 or in the previously-prepared biographical data file before beginning this activity. In 1850, Sir Francis Beaufort devised a wind-force indicator, the Beaufort scale. This scale relates wind speed to what can be seen moving in the wind.

Today, an instrument called an anemometer is used to measure wind speed. Prior to the development of the anemometer, the Beaufort scale was the main tool used to measure how strong the wind was blowing. This scale still provides a useful way to make general observations about the wind's strength.

Prepare the chart WHAT'S BLOWING?

This activity requires a small amount of class time for five consecutive days.

Materials

- Biographical Data: SIR FRANCES BEAUFORT (1774-1857)
- Chart: WHAT'S BLOWING?
- Marker
- Clock or watch
- Calendar

Procedures

1. Discuss with students the biographical information provided on Sir Francis Beaufort. Emphasize that the Beaufort scale is based entirely on what is observed.

2. Celebrate the development of the Beaufort scale by taking students outside and asking them to observe how forceful the wind is blowing. (It will be necessary to take the chart WHAT'S BLOWING? and a marker outside.)

3. Present the chart WHAT'S BLOWING? to students. Read the items listed under "Watch for These Signs" to the students. Ask students to decide what type of wind is blowing outside according to the Beaufort scale. Have students vote for one classification. Record the type wind, date, and time of day on the chart. Repeat this procedure for five days and record the data each day.

4. Return to the classroom each day, and select a student to utilize the Beaufort scale and give a wind report. Ask students what activities would be safe or unsafe to conduct during the various types of wind.

WHAT'S BLOWING?
Chart

Beaufort Scale

Watch for These Signs:	Type of Wind
1. Smoke rises straight up; smoke may drift.	Calm
2. Wind is felt on the face; leaves rustle.	Light breeze
3. Leaves and small twigs move; flags wave slightly.	Gentle breeze
4. Dust and bits of paper blow; small branches move; small trees sway; whitecaps appear on lakes and ponds.	Moderate breeze
5. Large branches move; whole trees sway; walking against the wind is difficult.	Strong breeze
6. Trees are uprooted; buildings are damaged.	Gale
7. Wind damage is widespread.	Storm

Wind Chart

Week of _____ (Dates) _____

DAY	TIME	TYPE OF WIND
Monday		
Tuesday		
Wednesday		
Thursday		
Friday		

OUTCOMES 35, 36, 37, 38, and 39 (Continued)

Background

Sir Issac Newton was a famous English scientist. This activity acquaints students with the work and accomplishments of Newton. Become familiar with the biographical information provided on Sir Issac Newton on page 93 or in the previously-prepared biographical data file before beginning this activity. In this activity, apples are used in the gravity demonstration and for student snacks. Obtain a videotape, posters, or pictures of astronauts' weightlessness in space. Marshall Space Flight Center in Huntsville, Alabama, provides resource people and materials upon request.

Materials

- Biographical Data: SIR ISAAC NEWTON (1642-1727)
- Apples
- Videotape, posters; or pictures of astronauts' weightlessness in space

For further information on space-related materials, contact:

Public Affairs Office
George C. Marshall Space Flight Center
National Aeronautics and Space Administration
Marshall Space Flight Center, AL 35812
Telephone: (205) 544-6545

Procedures

1. Discuss with students the biographical information provided on Sir Isaac Newton.

2. Drop an apple, and have students observe how the apple falls to the floor. Emphasize that a force, gravity, pulls the apple toward the ground. Gravity is a force exerted on all living and nonliving things on earth.

3. Tell students that Newton supposedly was hit on the head by an apple falling from a tree. His observation of this accident led him to infer that a force, gravity, pulled the apple toward the ground. Newton experimented to test his hypothesis.

4. Select a student to role-play Sir Isaac Newton. Take the class outside, and have students observe "Sir Isaac Newton" lying under a tree. Drop the apple near the student role-playing Newton.

5. Provide students with apple slices in honor of Sir Isaac Newton, a science hero.

Procedures (Continued)

6. Return to the classroom, and show a videotape, posters, or pictures of astronauts' weightlessness in space. Ask students to "brainstorm" what it would be like if Earth suddenly lost most of its gravitational pull. Provide time for student discussion and role-playing of "almost weightlessness on Earth."

OUTCOMES 35, 36, 37, 38, and 39 (Continued)

Background

An interest in plants and animals can lead to employment. Park rangers and game wardens protect wild animals in state and national parks and wilderness areas. Foresters care for trees in forests, select trees to be timbered, fight forest fires, and plant tree seedlings.

Prepare the student handout RING READING before beginning the activity. Collect and display posters or pictures of foresters.

Materials

- Posters or pictures of foresters

For each student:

- Handout: RING READING

Procedures

1. Present to students the following information regarding ring reading of trees:

   a. An old tree stump is like a time capsule. Valuable information concerning the age of a tree and climatic conditions of the past are displayed.

   b. Scientists have learned that every year a tree produces two growth rings: a light ring of rapid spring growth and a dark ring of slow summer growth.

   c. In very dry years, the rings are much narrower than in years with abundant rainfall. Rings may show scars that are evidence of a lightning strike or a forest fire.

2. Discuss with students the role that foresters play in managing state and national wooded areas. Emphasize that foresters must make scientific inferences concerning the life of a tree (age of the tree, weather patterns during the tree's life). Display posters or pictures of foresters on the job.

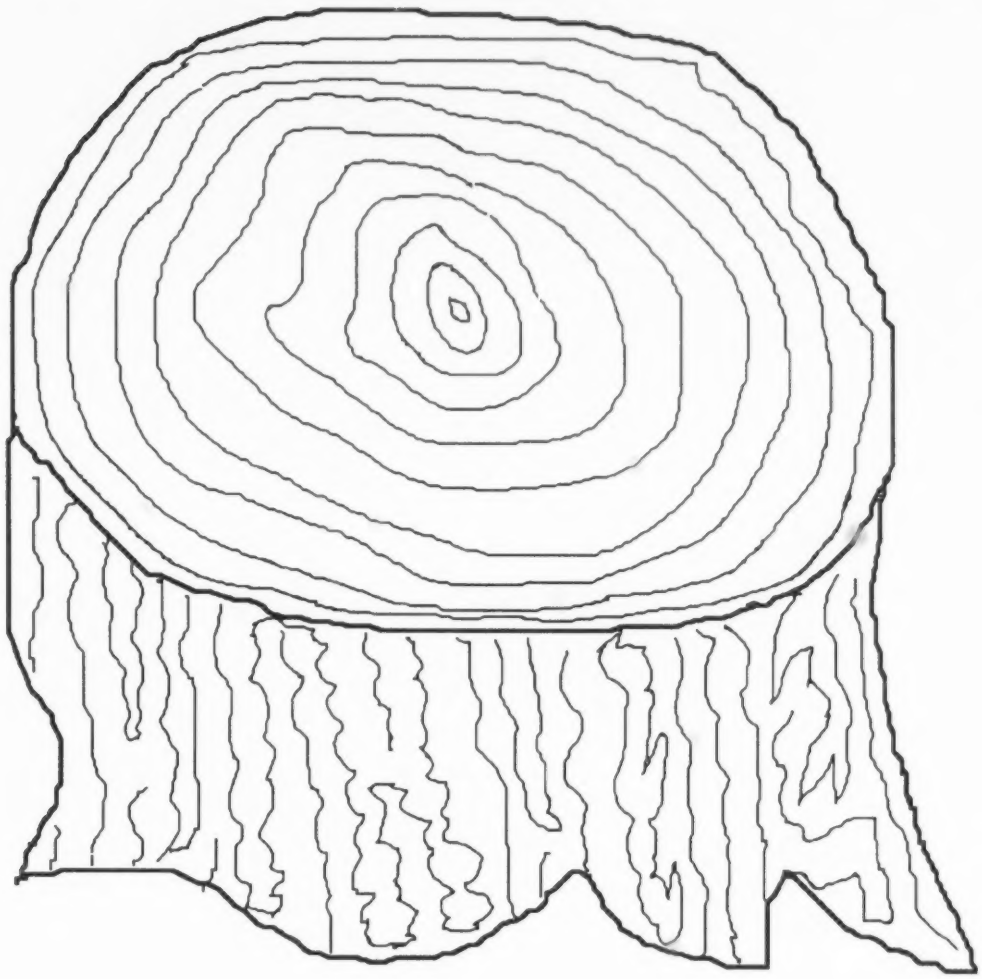
3. Distribute the handout RING READING. Ask students to observe the tree's cross-section. Direct students to determine how old the tree was when it was cut. Remind students that two rings are equal to one year's growth.

4. Ask students to examine the tree's cross-section carefully and make inferences about the weather during the tree's life. Review the information in Procedures 1.a., 1.b., and 1.c.

Extension

Invite a forester to visit the students in the classroom. Ask the forester to bring a tree corer and demonstrate the use of this instrument.

RING READING
Handout



Look closely at the cross-section. How old was the tree when it was cut? What can you infer about the weather during this tree's life?

Student name _____